GI Recalls

1997-2008

[redacted]

2008

[redacted]

2008

- Post transplant lymphoproliferative disorder
  - A. T cell mediated
  - B. From graft Versus host disease
  - C. Many are associated with EBV
  - D. Not seen in stem cell transplant

2008

- Post transplant lymphoproliferative disorder
  - A. T cell mediated
  - B. From graft Versus host disease
  - **C. Many are associated with EBV**
  - D. Not seen in stem cell transplant

Post Transplant Lymphoproliferative Disorder (PTLD)

- relatively uncommon
- complication of both solid organ and allogeneic BMT
- **In most cases, PTLD is associated with Epstein-Barr virus (EBV) infection of B cells**, either as a consequence of
  - reactivation of the virus posttransplantation
  - or from primary posttransplantation EBV infection acquired from the donor.
- While T-cell lymphoproliferative disorders not associated with EBV infection have also been documented after solid organ and bone marrow transplantation, the vast majority are B-cell proliferations.

http://emedicine.medscape.com/article/431364-overview

2008

- Most common site of posttransplant lymphoproliferative disease (recall)?
  - Pharynx
  - Stomach
  - Small bowel
  - Colon

2008

- Most common site of posttransplant lymphoproliferative disease (recall)?
  - Pharynx
  - Stomach
  - **Small bowel**
  - Colon

http://emedicine.medscape.com/article/854651-overview

2008

- Meconium Ileus
  - Ileal Atresia
- Microcolon
  - Most associated w/ ileal atresia

Ochsner Recall and Saba's Sister's Recall

Duke 2008

- Microcolon associated with (recall):
  - Ileal atresia
  - Hirschprung's
  - Duodenal atresia
  - Jejuneal atresia
  - Colonic atresia
  - Meconium plug

Duke 2008

- Microcolon associated with (recall):
  - Ileal atresia
  - Hirschprung's
  - Duodenal atresia
  - Jejuneal atresia
  - Colonic atresia
  - Meconium plug
  - **Associated with all of the above**

Variant Recall UGA (2003)

- **Which of the following is the most common cause of microcolon?**

- **Meconium ileus.**
- Meconium plug.
- Hirshprung's disease.
- Anal atresia.
- Duodenal atresia.

- Answer: A

- Info: **Ileal atresia and meconium ileus are most common cause in the neonate.** Meconium plug and Hirschprung's are also causes.

- Reference: Dahnert (5) 773, 846, Donnelly, Pediatric Requisites (?) 112-4

- Tests: 2003, 2008

DDx Microcolon

- Mnemonic: "MI MCA"
- Meconium Ileus, Meconium peritonitis (cystic fibrosis)
- Ileal/jejunal atresia
- Megacystis-microcolon-hypoperistalsis syndrome
- Colonic atresia (distal to atretic segment)
- Aganglionosis (Hirschsprung disease)

Meconium Ileus

- Ileus resulting from inspissated meconium obstructing the terminal ileum
- **constitutes approximately 20% of neonatal intestinal obstruction.**
- **almost always associated with cystic fibrosis.**
- **Of cystic fibrosis patients, 10% to 20% present with intestinal obstruction as a neonate (i.e., meconium ileus), which results from inspissated meconium obstructing the terminal ileum.**
- **rarely been seen in patients without cystic fibrosis who have intestinal pseudo-obstruction, pancreatic insufficiency, or aganglionosis.**
- **The dilated small bowel loops are filled with tarry tenacious meconium, and the colon is tiny (microcolon), secondary to failure of small bowel contents (succus entericus) to pass into the colon**

Meconium Ileus vs Ileal Atresia

Meconium Ileus

- On US- the abnormal intestinal contents are hyperechoic and are associated with dilated bowel loops
- Relative or even total absence of air fluid levels
- BE= Reflux of contrast material into the terminal and distal ileum may show pellets of **meconium as filling defects**

Ileal Atresia

- On US- dilated bowel filled with fluid and air
- BE= **If one can reflux contrast material into terminal and distal ileum, filling the dilated loops of small bowel, this helps to exclude ileal atresia**

DDx for a Microcolon

- includes meconium ileus, ileal atresia, and total colonic aganglionosis or Hirschsprung disease
- If one can reflux contrast material into terminal and distal ileum, filling the dilated loops of small bowel, this helps to exclude ileal atresia
- If reflux shows dilated, meconium-packed terminal ileum and more proximal dilated small bowel, uncomplicated meconium ileus is present
- Easy reflux into dilated, but not meconium-packed terminal ileum suggests total colonic Hirschsprung disease
- Abrupt termination of terminal ileum can be seen in ileal atresia or complicated meconium ileus (with atresia, volvulus).
- When the ileocecal valve is competent and cannot be refluxed, an exact diagnosis cannot be made, and surgical intervention is required for definitive diagnosis.
- Most surgeons prefer not to operate on uncomplicated meconium ileus and appreciate every effort by the radiologist to exclude this diagnosis.

Ileal atresia

- **95% of intestinal obstructions diagnosed in the first two weeks of life are due to atresia and/or stenosis of small intestine**
- Atresia represents complete luminal obstruction of a hollow viscus, and stenosis involves partial occlusion
- Atresia is more common than stenosis.
- At birth, complete obstruction is present with atresia, whereas various degrees of stenosis manifest with mild-to-severe sequelae.
- **Ileal atresia represents 50% of small-intestinal atresias.**
- Ileal atresia is more common than jejunal atresia.

http://emedicine.medscape.com/article/409746-overview

Ileal Atresia

- Ischemia is the cause for jejunal and ileal atresia and stenosis.
- Because the bowel contents are sterile in the fetus, the necrotic tissue is resorbed or converted into fibrous bands.
- The succus entericus, which forms the meconium, is composed of secretions from the stomach and small bowel, desquamated cells, and secreted fluid and bile. Exposure to succus entericus expands the size of the colon from its fetal size. The timing and location of atresia determines whether the succus entericus enters the colon during its development.
- In proximal atresias, the colon is normal or nearly normal in size, because adequate succus entericus reaches the colon from small bowel distal to the obstruction.
- On the other hand, distal atresias are usually associated with an unused colon or microcolon less than 1 cm in diameter.
- When the ischemic event occurs later in gestation, the colon may be normal in caliber, even if the obstruction is distal.

http://emedicine.medscape.com/article/409746-overview

2008

- Esophagus in a young man shows UES stricture that has tapered ends. There are concentric multiple rings in this area
  - A. Eosinophilic esophagitis
  - B. Feline Esophagus
  - C. Chronic reflux
  - D. Caustic

2008

- Esophagus in a young man shows UES stricture that has tapered ends. There are concentric multiple rings in this area
  - A. **Eosinophilic esophagitis- rings, stricture**
  - B. Feline Esophagus- transient rings
  - C. Chronic reflux-
  - D. Caustic Esophagitis- this answer not included in Duke recalls.

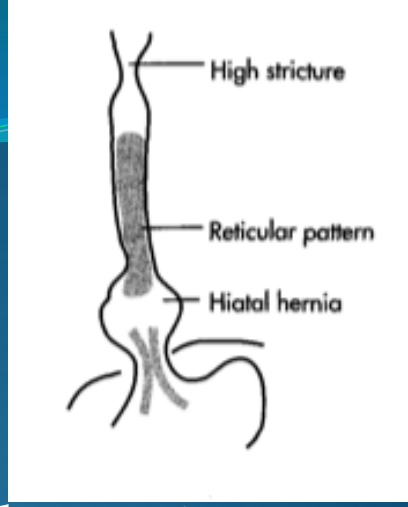
Duke Recall 2008

- 25 year old male regurgitates undigested food and has dysphagia. Endoscopy shows upper esophageal narrowing with tapered margins and concentric rings (new):
  - Feline esophagus
  - Chronic reflux
  - Eosinophilic esophagitis
  - Infectious esophagitis

Duke Recall 2008

- 25 year old male regurgitates undigested food and has dysphagia. Endoscopy shows upper esophageal narrowing with tapered margins and concentric rings (new):
  - Feline esophagus
  - Chronic reflux
  - **Eosinophilic esophagitis**
  - Infectious esophagitis

Chronic Reflux



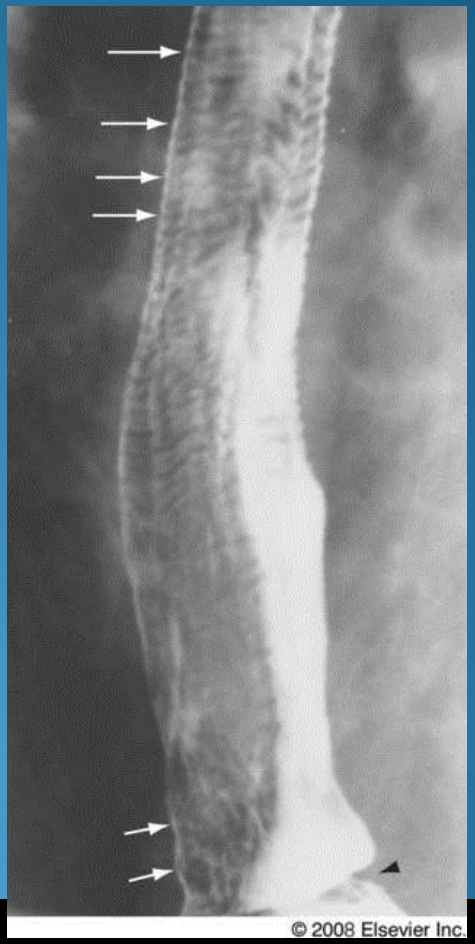
- Barrett's Esophagus
  - Esophagus is abnormally lined with columnar, acid secreting gastric mucosa.
  - Usually due to chronic reflux esophagitis
  - Increased risk of esophageal ca
  - Radiographic Features
    - Reticular mucosal pattern, which may be discontinuous in the distal esophagus (short segment)
    - Suspect the dx if there is
      - High esophageal stricture accompanied by reticular mucosal pattern (long segment) below transition or ulcer
      - Low strictures: the majority cannot be differentiated from simple reflux esophagitis strictures and biopsies are required

Feline Esophagus

- folds are
  - 1-2 mm wide,
  - crossing the entire lumen of the esophagus
  - in a transverse orientation, but are angulated in several places, in a “herringbone” pattern.
- The folds are a transient phenomenon, seen either during upright double-contrast images or while a patient is exhibiting gastroesophageal reflux.

Feline Esophagus

- folds of **feline esophagus**
  - **are transient, thin, and shallow, and involve the entire circumference of the esophagus.**
- Spot radiograph from double-contrast esophagogram shows
  - numerous 1-2 mm radiolucent folds crossing the entire lumen of the **esophagus.**
  - **The folds are not straight, but have several shallow angles.**
  - **In profile, the folds are < 1 mm in height.**
  - **A representative area of these transverse folds-termed the feline esophagus-is identified by *large arrows.***
  - ***The esophagogastric junction is identified by an arrowhead. Granular mucosa resulting from reflux esophagitis is seen (small arrows).***

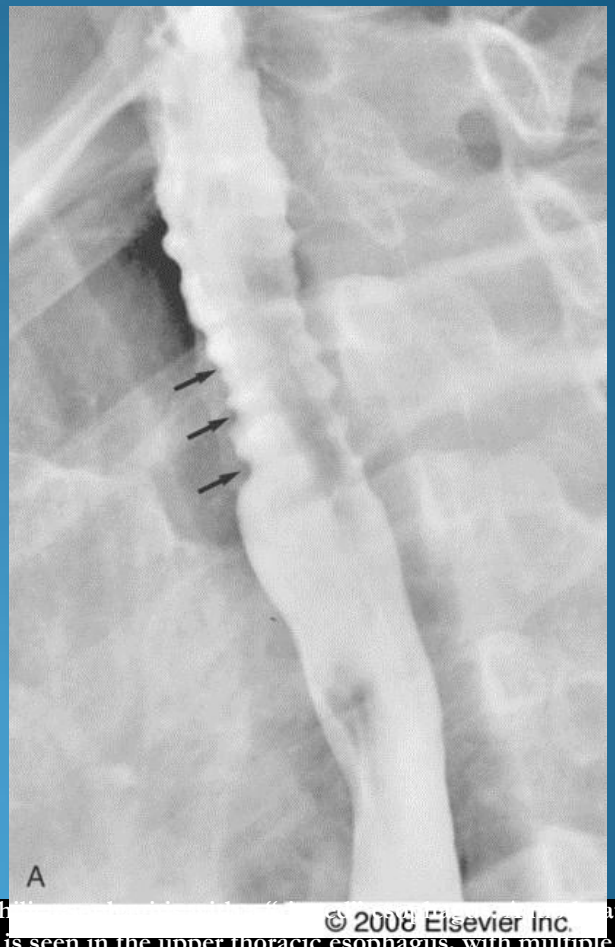


Eosinophilic Esophagitis

- **Thick, persistent transverse folds crossing the lumen of esophagus are seen focally in patients with eosinophilic esophagitis.**
- **These folds are 3-4 mm thick, much thicker than the thin folds of feline esophagus. In addition, folds in eosinophilic esophagitis are straight, not angled, and much less numerous than the folds of feline esophagus**
- Increased number of intraepithelial eosinophils (more than 20 per high power field) on endoscopic biopsy specimens from esophagus.
- **Ringed esophagus**
- Diffuse esophageal narrowing, resulting in a "small-caliber" esophagus
- Presenting symptoms: dysphagia, food impaction , heartburn, chest pain, vomiting, regurgitation and abdominal pain
- Male predisposition in both adults and pediatric population

Eosinophilic Esophagitis

- Development of one or more segmental strictures in upper esophagus, midesophagus, or, less commonly, distal esophagus
- Distinctive ringlike indentations, resulting in ringed esophagus
- Multiple, closely spaced, concentric rings traversing stricture
- Diffuse esophageal narrowing, resulting in "small-caliber" esophagus
- Abnormal motility with increased frequency of nonperistaltic contractions or even an achalasia-like syndrome
- Rarely, small, sessile **eosinophilic polyps may be found in esophagus**



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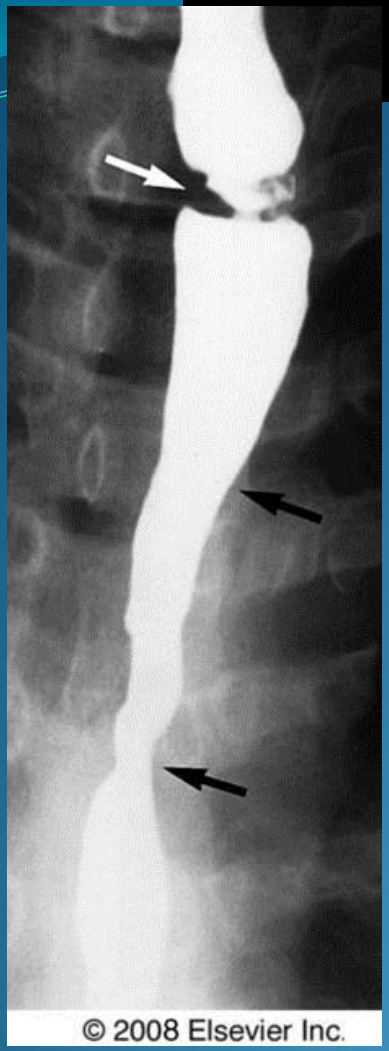
Eosinoph… …ately long stricture is seen in the upper thoracic esophagus, with multiple distinctive ringlike indentations (arrows) in the region of the stricture.



Eosinophilic Esophagitis

Caustic Esophagitis

- Patients with lye strictures have significantly increased risk of developing esophageal carcinoma 20-40 years after initial **caustic injury**
- One or more smooth or irregular strictures in upper or midesophagus, often with eccentric areas of sacculation because of asymmetric scarring
- Severe scarring of entire thoracic esophagus with threadlike, filiform appearance highly suggestive of **caustic stricture**



Lye strictures. A long, tapered stricture (black arrows) is seen in the upper thoracic esophagus. Another short, asymmetrical stricture (white arrow) is seen more proximally at the thoracic inlet. The presence of one or more segmental strictures in the cervical or thoracic esophagus is characteristic of caustic injury.



Advanced lye strictures. There is diffuse narrowing of the thoracic esophagus due to extensive scarring and fibrosis in this patient with lye stricture. This appearance should suggest caustic injury because other conditions are rarely associated with such severe esophageal narrowing.



Advanced lye strictures. There is diffuse narrowing of the thoracic esophagus due to extensive scarring and fibrosis in this patient with lye stricture. This appearance should suggest caustic injury because other conditions are rarely associated with such severe esophageal narrowing.

2008

- Rectal Tumor is related to pair of things
  - A. Depth and Lymph node
- Duke Recall:
  - Most important rectal cancer prognosis (recall variant):
    - Depth of involvement and proximity to anal sphincter
    - Depth of involvement and lymph node involvement

2008

- Rectal Tumor is related to pair of things
  - A. Depth and Lymph node
- Duke Recall:
  - Most important rectal cancer prognosis (recall variant):
    - Depth of involvement and proximity to anal sphincter
    - **Depth of involvement and lymph node involvement**

2008

- Hypoperfusion complex, what does not enhance
  - A. Liver
  - B. Kidneys
  - C. Bowel
  - D. Adrenal glands
  - E. These were all the choices listed

2008

- Hypoperfusion complex, what does not enhance
  - A. **Liver-** the liver and spleen demonstrate decreased enhancement
  - B. Kidneys- enhance (possibly delayed)but don't excrete, persistent nephrogram
  - C. Bowel- increased enhancement
  - D. Adrenal glands- increased enhancement
  - E. These were all the choices listed

Hypoperfusion Complex

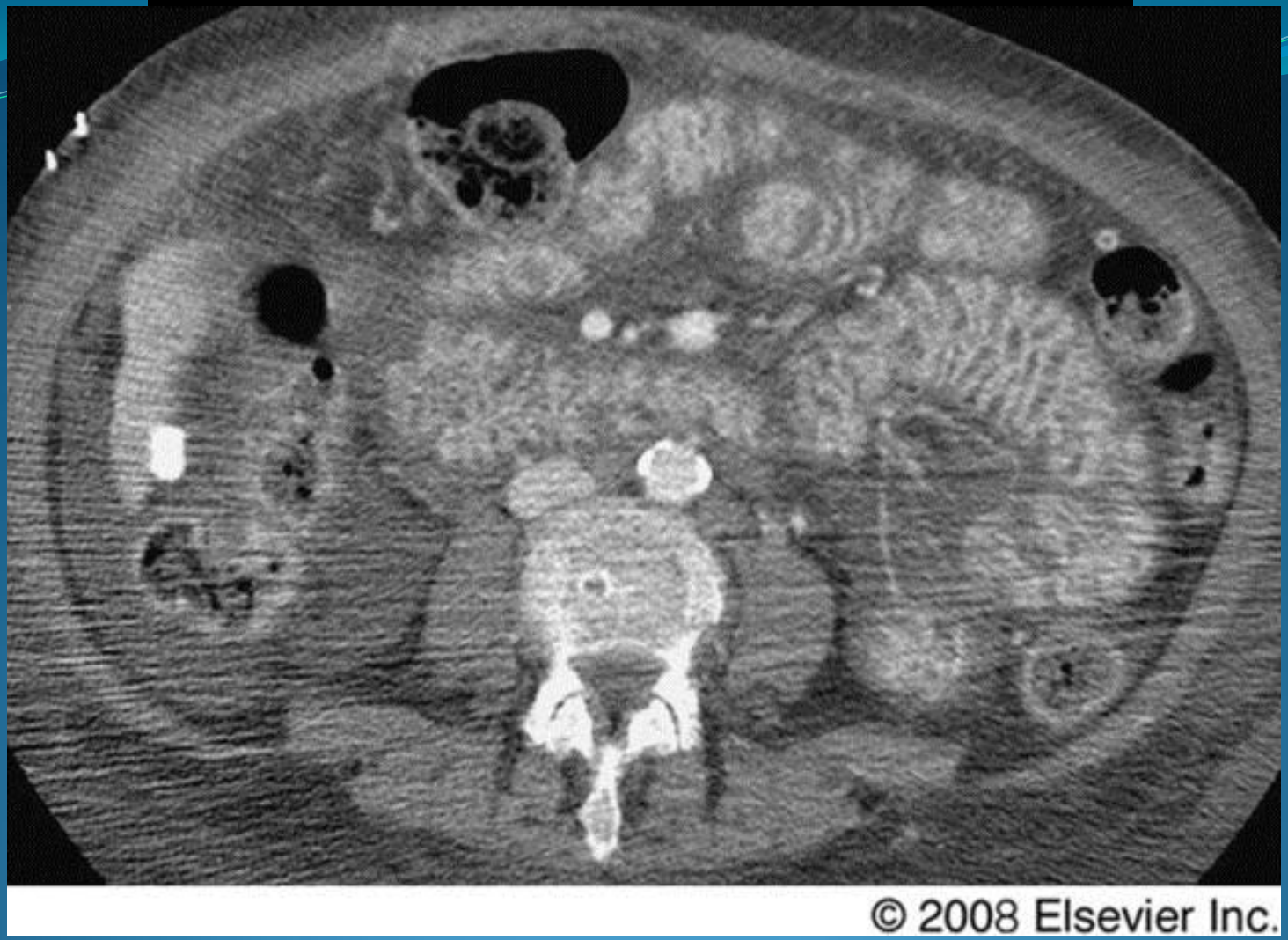
- “collapsed cava” sign = persistent flattening of IVC (due to decreased venous return)
- abort CT examination as shock is imminent!
- Small hypodense spleen (decreased enhancement)
- Small aorta + mesenteric arteries (due to intense vasoconstriction)
- Shock nephrogram= lack of renal contrast excretion
- “shock bowel”= dilatation of fluid filled intestines + generalized thickening of small folds + increased enhancement (due to vasoconstriction of mesenteric vessels)
- Marked enhancement of adrenal gland
- Intense pancreatic enhancement
- Dahnert

Hypoperfusion Complex

- Shock bowel is the most widely reported and familiar CT sign of hypovolemic shock in trauma patients
- characterized by
  - bowel segments with marked submucosal edema and intense mucosal enhancement- Shock Bowel
- May also be associated with
  - Collapse of the IVC and Aorta
  - Variable enhancement of the pancrease with peripancreatic fluid
  - Delayed nephrograms
  - Decreased enhancement of the spleen and liver
  - Increased enhancement of the adrenals
- These findings have been thought to be caused by hypovolemia instead of direct damage to the viscera, and the appropriate treatment is supportive therapy rather than surgical intervention
- It is critical to avoid confusion with other conditions, such as bowel ischemia, bowel injury, and splenic injury, that might require urgent intervention.

AJR 2009; 192:W230-W235© American Roentgen Ray Society ***Clinical Observations***

CT Hypotension Complex (Shock Bowel) Is Not Always Due to Traumatic Hypovolemic Shock Jennifer T. Ames[1] and Michael P. Federle[1,2]


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Axial contrast-enhanced CT scan shows intense mucosal enhancement of the entire small bowel with mild wall thickening. Free intraperitoneal fluid also is present.

Hypoperfusion Complex



Figure 2 Contrast-enhanced CT demonstrated intense bilateral symmetrical contrast enhancement of the adrenal glands, with normal visceral enhancement.

2008

- HCC
  - A. T1 increased enhancement with central clearing later
- Duke 2008
  - Most specific for HCC (new):
    - A. High T2, low T1
    - B. Enhancement with arterial phase MRI, and central washout
    - C. Enhancement on 10 minute delayed imaging

2008

- HCC
  - A. **T1 increased enhancement with central clearing later**
- Duke 2008
  - Most specific for HCC (new):
    - A. High T2, low T1
    - **B. Enhancement with arterial phase MRI, and central washout**
    - C. Enhancement on 10 minute delayed imaging

HCC and MRI

- Low-intensity, isointensity, and high-intensity patterns seen on T1-weighted images
- Hyperintense on T2-weighted images“Nodule within a nodule” appearance
- Fibrous capsule may be demonstrated as a hypointense band on delayed-phase images
- Early enhancement in the hepatic arterial phase, rapidly becomes hypointense due to contrast medium washout on delayed phase
- Miliary pattern
- Encapsulated inhomogenous unifocal tumo

HCC and MRI

- Hypointense (50%)/ iso to hyperintense (with fatty metamorphosis) on T1WI
- Ring sign= well defined hypointense capsule on T1WI (24-44%), double layer of inner hypointensity (fibrous tissue) + outer hyperintensity (compressed blood vessels + bile ducts) on T2WI in expansive type of HCC
- Mildly hyperintense on T2WI
- Gd-DTPA enhancement peripherally (21%)/ centrally (7%)/ mixed (10%)/ no enhancement (21%)
- Improved lesion detectability after intravenous administration of superparamagnetic iron oxide

Dahnert 714

2008

- What is not a giant ulcer in the esophagus
  - A. herpes

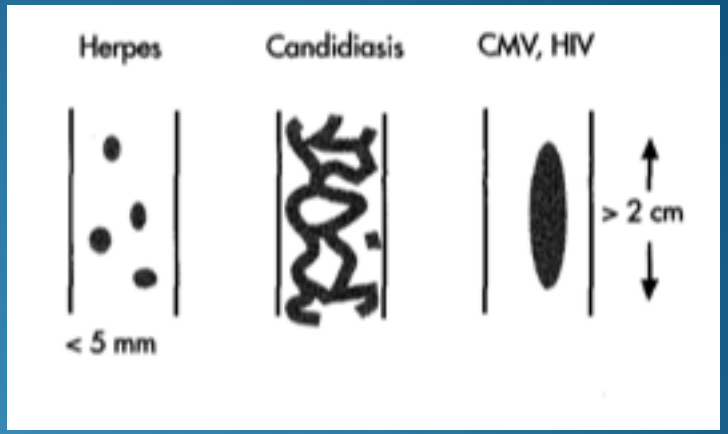
Duke 2008

- Esophageal ulcer > 3cm, most unlikely (recall):
  - CMV
  - Herpes
  - HIV
  - Cancer

Duke 2008

- Esophageal ulcer > 3cm, most unlikely (recall):
  - CMV
  - **Herpes**
  - HIV
  - Cancer

Esophagitis



- Due To
  - Herpes
    - Abnormal motility
    - Small ulcers, <5mm
  - Candidiasis
    - Plaquelike, reticular
    - Abnormal motility
  - CMV & HIV
    - Typically large ulcers
    - Etiological distinction btw CMV and HIV ulcers is important because therapies are different

Primer pg 161

2008- New

- Pseudomembranous Colitis
  - A. Complication is toxic megacolon
  - B. Most often pts have dehydration and diarrhea
  - C. IV vancomycin
  - D. Leads to surgery

2008- New

- Pseudomembranous Colitis
  - A. Complication is toxic megacolon- True
  - B. Most often pts have dehydration and diarrhea- True
  - C. IV vancomycin- True- Tx includes vancomycin or metronidazole and to stop offending antibiotic that may have caused it
  - D. Leads to surgery- Two thirds of patients with toxic megacolon require surgical intervention but overall, frequency of surgical intervention is low 0.4%-3.6%

Duke 2008

- Pseudomembraneous colitis associated with (new):
  - Most have sx of diarrhea and dehydration- **True**
  - Toxic megacolon is a complication- **True**
  - Tx with iv vancomycin- **True** Tx= stop the offending agent, provide supportive care for the diarrhea, and tx with vancomycin or metronidazole
  - Need surgery- frequency of surgical intervention is low 0.4%-3.6%

2008

- Gastric emphysema is most common after
  - A. Gastric volvulus
  - B. Gastroscopy
  - C. Left gastric artery thrombosis
  - D. NG Tube Placement
- Duke Version 2008
  - Most common cause of intramural stomach gas in adult (new):
    - A. Gastroscopy
    - B. Volvulus
    - C. NGT



2008

- Gastric emphysema is most common after
  - A. Gastric volvulus
  - B. **Gastroscopy**
  - C. Left gastric artery thrombosis
  - D. NG Tube Placement
- Duke Version 2008
  - Most common cause of intramural stomach gas in adult (new):
    - A. **Gastroscopy**
    - B. Volvulus
    - C. NGT



- Gastric Emphysema - asymptomatic
  - Air in the stomach wall with an appearance similar to emphysematous gastritis with a much more benign clinical course
  - Caused by disruption in mucosa leading to air dissecting into wall from:
    - Gastric outlet obstruction with increased intraluminal pressure
    - Severe vomiting
    - Instrumentation-like endoscopy
    - Dissection of air from mediastinum from ruptured bleb or pneumothorax
    - Pneumatosis cystoids - submucosal air collections
- Emphysematous gastritis – deathly ill
  - Rare and severe gastritis secondary to mucosal disruption and gas-forming bacterial invasion
  - Characterized by air in the wall of the stomach
  - Causes:Ingestion of toxic material such as corrosives, Alcohol ingestion, Trauma, Gastric infarction, Ulcer disease

http://www.learningradiology.com/notes/ginotes/gastricemphysemapage.htm

2008

- PEG tube placed and then increasing pneumoperitoneum, what to do?
  - A. Check side hole position
  - B. Observe
  - C. Replace surgically
  - D. Put in a bigger one
- Duke 2008
- S/P gastrostomy, now pt has increasing pneumoperitoneum. What to do?
  - A. Replace tube with larger one.
  - B. Check side hole placement.
  - C. Put tube to suction and retake Xray
  - D. Normal finding; start clear liquids in 24 hours

2008

- PEG tube placed and then increasing pneumoperitoneum, what to do?
  - A. **Check side hole position-** I think the keyword is "increasing" and therefore this could represent a leak and placement should be checked.
  - B. Observe
  - C. Replace surgically
  - D. Put in a bigger one
- Duke 2008
- S/P gastrostomy, now pt has increasing pneumoperitoneum. What to do?
  - A. Replace tube with larger one.
  - B. **Check side hole placement.**
  - C. Put tube to suction and retake Xray
  - D. Normal finding; start clear liquids in 24 hours

G- tube

- Peritonitis is a rare but serious complication following gastrostomy and may result as a consequence of leakage or inadvertent infusion of the nutrient into the peritoneal cavity. Early detection, discontinuation of feedings, and antibiotics can control a minor leak. Contrast studies through the tube may fail to show the leak, but an enlarging pneumoperitoneum is considered to be a reliable sign of intraperitoneal leakage.- Vascular and Interventional Radiology Karim Valji pg 530
- Pneumoperitoneum is common post-PEG placement. Its etiology is though to be secondary to the insufflation of air associated with the endoscopic procedure and needle puncture of the gastric wall. In the absence of peritonitis it has no consequence and should not preclude feedings. However, pneumoperitoneum may cause confusion for clinicians in those pts where clinical features raise concern about a ruptured viscous. In these settings, a contrast radiology study should be obtained to confirm the position of the PEG tube within the stomach and to exclude a leak. UptoDate --**Prevention and management of complications from percutaneous endoscopic gastrostomy**

G- Tube

- Any child with suspected peritonitis after radiologic **gastrostomy requires prompt evaluation. Feeds should be held, and an urgent G tube check should be performed to confirm position of the G tube and to rule out leakage of gastric contents into the peritoneum. Pneumoperitoneum is a common normal finding immediately after radiologic gastrostomy;**late or increasing pneumoperitoneum may represent unrecognized perforation of the gastrointestinal tract or ongoing **leak around the G tube siteConservative management, including bowel rest, total parenteral nutrition, empiric antibiotics, and close observation, is usually sufficient, but a surgical consultation may be required. Transgression of the small intestine and colon during insertion, migration of the gastric pigtail into the tract, and significant enlargement of the stoma necessitating tube removal have also been observed by the authors but were not seen in our sample of patients.-** (PEDIATRICS Vol. 114 No. 2 August 2004, pp. 458-461**Complications Associated With Image-Guided Gastrostomy and Gastrojejunostomy Tubes in Children**)

G-Tube

- Loss of tension on the retention suture may result in falling away of the gastric anterior wall from the abdominal wall, along with a significant pneumoperitoneum. Alternatively, the retention suture may cut through the gastric wall to lie in the peritoneum or in the abdominal wall, resulting in a similar separation. Aspiration of the pneumoperitoneum can help reappose the stomach wall to the abdominal wall; tension is then reapplied to the retention thread or the gastric coil.- ImagingConsult.com

G Tube

- Transient **pneumoperitoneum occurs in nearly one half of all PEG-placement procedures and is of no consequence but of course must be distinguished from pneumoperitoneum occurring in the setting of peritonitis resulting from injury to an intra-abdominal viscus. (Gastrointestinal Endoscopy Clinics of North America Vol 17 Issue 4)**

2008

- HCC versus cholangiocarcinoma
  - A. HCC has venous invasion
  - B. Has enhancement greatest at 10 min
  - C. AFP is high in fibrolamellar

2008

- HCC versus cholangiocarcinoma
  - A. HCC has venous invasion- **HCC has an infinity for venous involvement**
  - B. Has enhancement greatest at 10 min- **Cholangiocarcinoma demonstrates persistent enhancing tumor on delayed phase due to a fibrous stroma**
  - C. AFP is high in fibrolamellar- **Usually AFP levels are normal in Fibrolamellar HCC**

2008

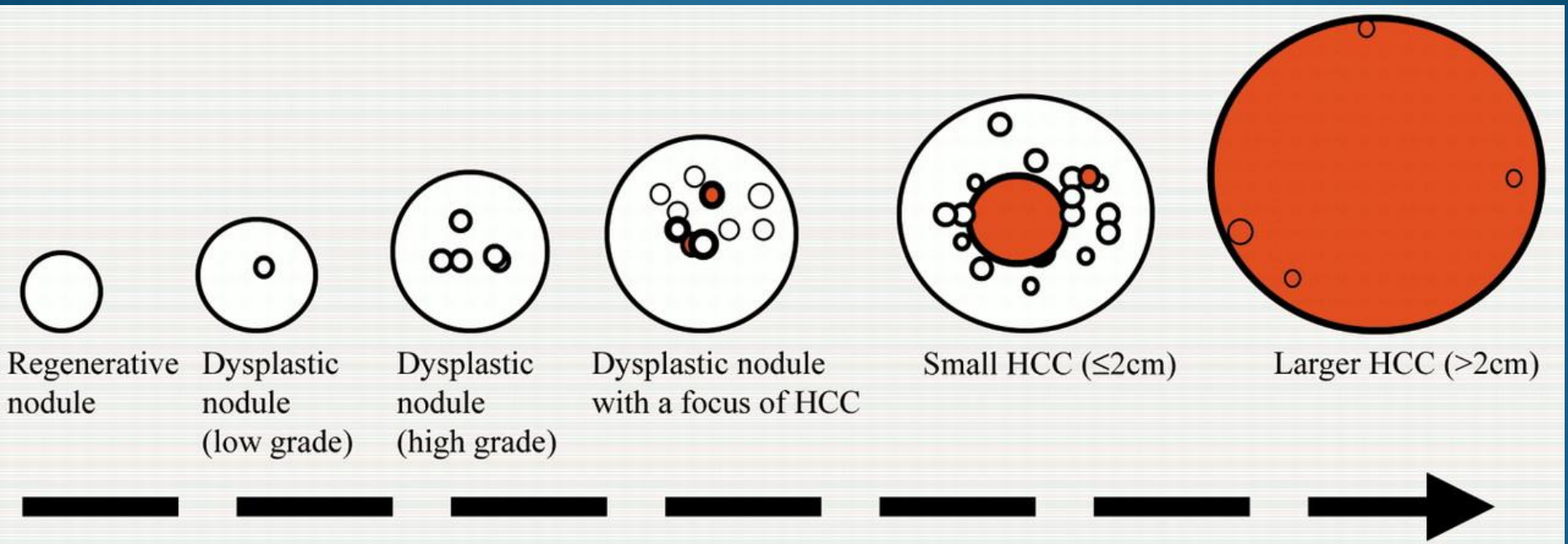
- HCC what is true
  - Worldwide most associated with alcohol-
  - Increased AFP with fibrolamellar type
  - Regenerative nodule is a direct precurosr
  - Can’t remember right answer

2008

- HCC what is true
  - Worldwide most associated with alcohol- False
  - Increased AFP with fibrolamellar type - False
  - Regenerative nodule is a direct precursor- False, it is a precursor but the direct precursor is a dysplastic nodule
  - Can't remember right answer

Radiographics 2002, 22: 1023-1036

Benign vs Malignant Hepatic Nodules: MR Imaging Findings with Pathologic Correlation



Stepwise pathway of carcinogenesis for HCC in cirrhosis. One or more regenerative nodules may show signs of atypia () and change into dysplastic nodules. Atypia indicates a number of changes in the shape and size of the nuclei and the cytoplasm of the hepatocytes. These changes often result in an increased number of cells (increased cellularity), which may be present in groups of small cells (small cell dysplasia) or large cells (large cell dysplasia). Atypia within dysplastic nodules can progress further and give rise to small and large HCCs. In addition to the cellular changes, the hepatic parenchymal structure will often be distorted in HCC.

2008

- Acute Mesenteric Ischemia
  - A. Cardiogenic origin of clot
  - B. Occlusion from focal plaque
  - C. Thromboembolism from aorta
  - D. Hypovolemia
- Duke 2008 Version
  - Most common cause of acute mesenteric ischemia (new)?
    - A. Low cardiac output in the setting of a non occlusive mesenteric vessel lesion
    - B. Thromboembolism from a cardiac source.
    - C. Artheroembolism from Aorta

2008

- Acute Mesenteric Ischemia
  - A. **Cardiogenic origin of clot-** most common cause
  - B. Occlusion from focal plaque- also causes AMI
  - C. Thromboembolism from aorta- also causes AMI
  - D. Hypovolemia- also causes AMI
- Duke 2008 Version
  - Most common cause of acute mesenteric ischemia (new)?
    - A. Low cardiac output in the setting of a non occlusive mesenteric vessel lesion
    - B. **Thromboembolism from a cardiac source**.
    - C. Artheroembolism from Aorta

AMI

- Insufficient blood perfusion to the small bowel and colon may result from arterial occlusion by embolus or thrombosis (AMAE or AMAT), thrombosis of the venous system (MVT), or nonocclusive processes such as vasospasm or low cardiac output (NOMI).
- **Embolic phenomena account for approximately 50% of all cases**, arterial thrombosis for about 25%, NOMI for roughly 20%, and MVT for less than 10%
- **Embolic Acute Mesenteric Ischemia is usually caused by an embolus of cardiac origin**. Typical causes include mural thrombi after myocardial infarction, atrial thrombi associated with mitral stenosis and atrial fibrillation, vegetative endocarditis, mycotic aneurysm, and thrombi formed at the site of atheromatous plaques within the aorta or at the sites of vascular aortic prosthetic grafts interposed between the heart and the origin of the superior mesenteric artery
- Thrombotic AMI is a late complication of preexisting visceral atherosclerosis. Symptoms do not develop until 2 of the 3 arteries (usually the celiac and superior mesenteric arteries) are stenosed or completely blocked. Progressive worsening of the atherosclerotic stenosis before the acute occlusion allows time for development of additional collateral circulation

http://emedicine.medscape.com/article/189146-overview

2008

- Vagus enters diaphragm with
  - A. Esophagus
- Duke Version 2008
  - Under diaphragm, vagus nerve follows (new)?
    - A. esophagus
    - B. aorta
    - C. azygous vein

2008

- Vagus enters diaphragm with
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- Duke Version 2008
  - Under diaphragm, vagus nerve follows (new)?
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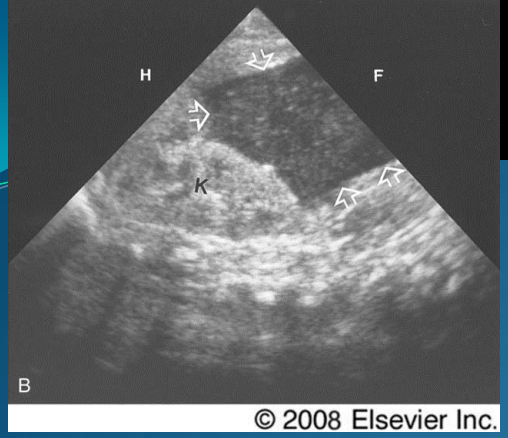
2008

- Meconium periotonitis
  - Indicates perforation of bowel

Meconium Peritonitis

- When bowel perforation occurs in utero, sterile meconium leaks into the peritoneal cavity and creates chemical peritonitis
- Fetal ascites may have echogenic debris, echogenicity along peritoneal surfaces, abnormal cystic abdominal masses, and bowel dilatation.
- Generalized abdominal haziness, bulging flanks, and centralization of bowel loops
- Peritoneal calcifications
- When bowel perforation occurs in utero, sterile meconium leaks into the peritoneal cavity and creates chemical peritonitis
- Perforation caused by any process producing bowel ischemia: volvulus, internal hernia, intussusception, meconium ileus with or without cystic fibrosis
- Peritonitis associated with atresia, adhesions, intra-abdominal cystic masses, ascites, scrotal masses, and in many cases, intraperitoneal or scrotal calcifications

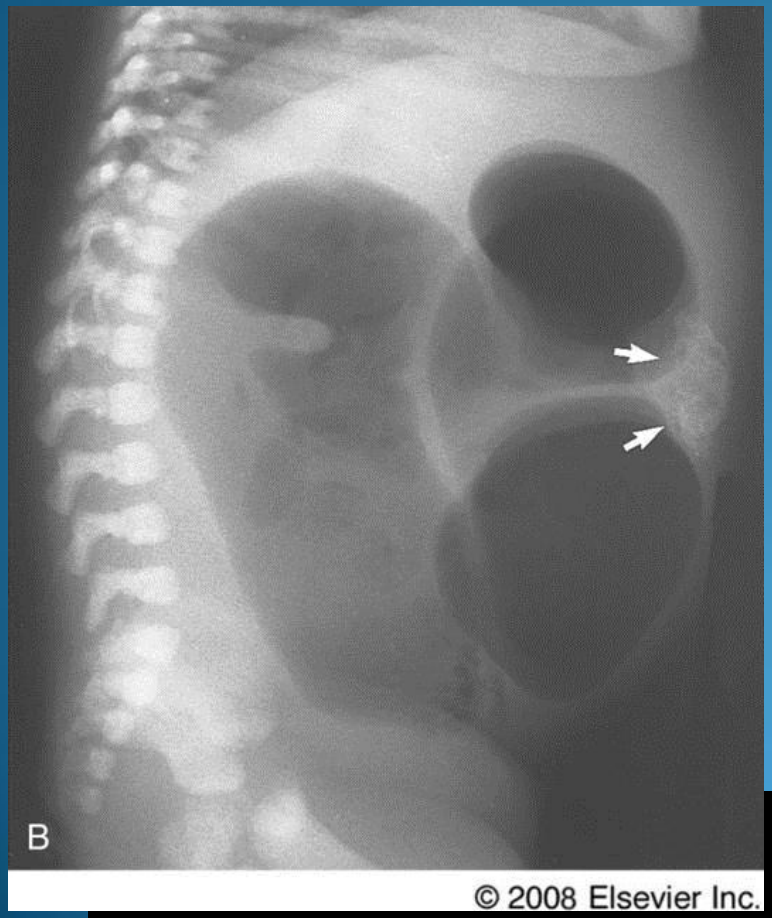
Meconium Peritonitis



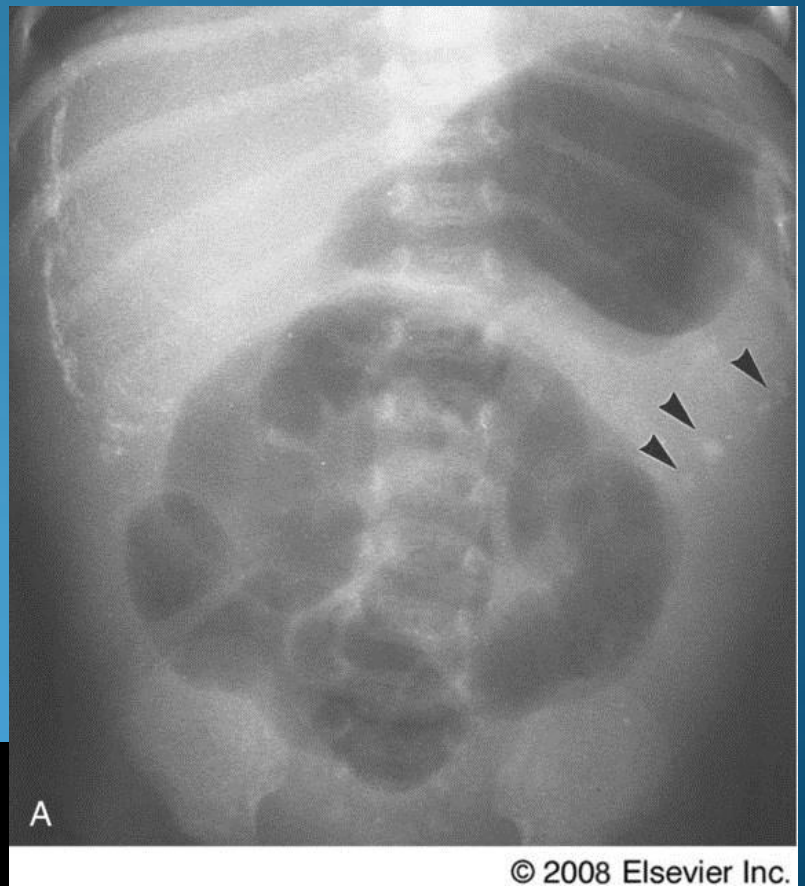
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Peritoneal collection of meconium

Calc along abd wall indicates prior perforation and Meconium peritonitis



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2008

- Cecal AVMS
  - Cecal diverticulitis,
  - s/p appendectomy
- Duke 2008 Version
  - Cecal AVM associated with (new):
    - Prior appendicitis
    - Pulmonary AVM
    - Diverticulitis
    - Aortic stenosis

2008

- Cecal AVMS
  - Cecal diverticulitis,
  - s/p appendectomy
- Duke 2008 Version
  - Cecal AVM associated with (new):
    - Prior appendicitis
    - Pulmonary AVM
    - Diverticulitis
    - **Aortic stenosis – Dahnert pg 792 20% associated with AS**

Vascular Ectasias(Arteriovenous Malformations)

- Colonic AVMs are most commonly seen in the cecum
- Can be variable in size, single or multiple
- Multiple AVMs can be associated with disease entities such as hereditary telangiectasia, Osler-Wweber-Rendu disease, and the Calcinosis, Raynaeus'd, Esophageal dysmotility, sclerodactyly and Telangiectasia (CREST) syndrome in association with scleroderma
- Represent a dilated complex of arterioles, venules and communicating capillaries
- Development of such dilatation is commonly thought to be related to increased pressure within the colonic lumen. Greater tension in the cecal wall may explain the preponderance of these lesions in the right colon
- Several reports have suggested a higher incidence of AVMs in patient's with aortic stenosis (Heyde's syndrome), chronic renal insufficiency and von Willebrand's disease.
- Increased incidence of Aortic Stenosis in pts with GI AVMS

Diseases of the Colon by Steven D. Wexner and Neil Stollman Chapter 17

Heyde’s Syndrome

- **Heyde's syndrome is a syndrome of aortic valve stenosis associated with gastrointestinal bleeding from colonic angiodysplasia. It is named after Dr. Edward C. Heyde, who first described the association in 1958. It is due to the induction of von Willebrand disease type IIA by the valvular stenosis**

http://en.wikipedia.org/wiki/Heyde's_syndrome

2008

- Intra and extrahepatic strictures w/ papillary stenosis:
  - A. AIDS cholangitis,
  - B. recurrent pyogenic ,
  - C. Ascending
- Duke Version 2008-
  - A. Multiple intra and extrahepatic biliary strictures with papillary stenosis (recall):
  - B. HIV
  - C. Recurrent cholangitis
  - D. Pyogenic cholangitis

2008

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  - A**. AIDS cholangitis,**
  - B. recurrent pyogenic ,
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- Duke Version 2008-
  - A. Multiple intra and extrahepatic biliary strictures with papillary stenosis (recall):
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AIDS Related Cholangitis

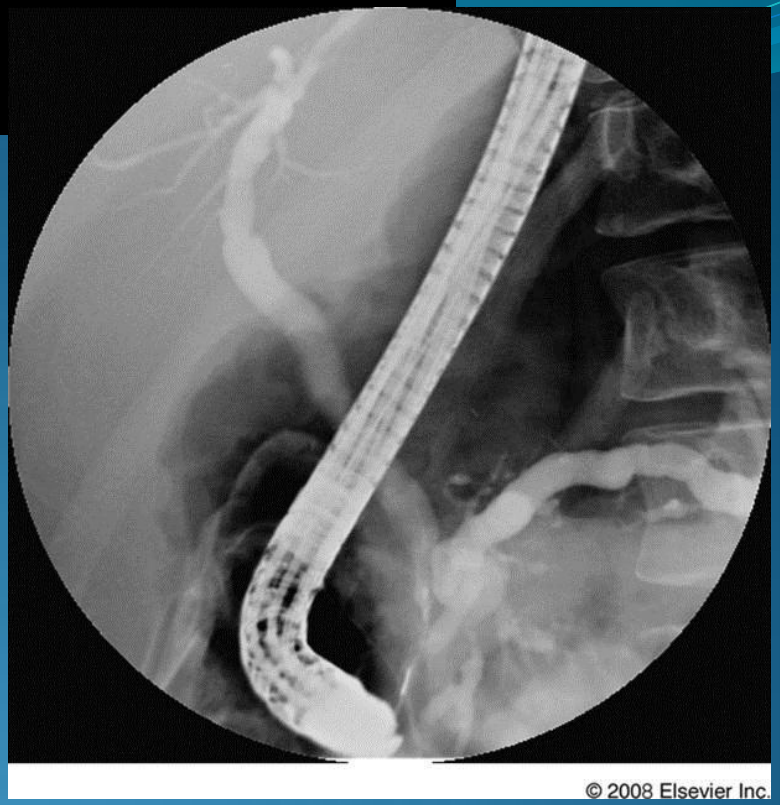
- **Cholangitis due to cryptosporidia, cytomegalovirus which is common component of acquired immune deficiency syndrome (AIDS)**
- Cholangiograms show irregularities and strictures of intrahepatic and extrahepatic bile ducts with associated ductal dilatation
- Papillary stenosis may be seen as isolated finding or associated with other finding
- Polypoid intraluminal filling defects may be seen due to granulation tissue
- Mural thickening of gallbladder and bile ducts
- Resembles primary sclerosing **cholangitis (SPC)**

Recurrent Pyogenic Cholangitis

- **Synonyms:*RPC, Oriental cholangiohepatitis, Oriental cholangitis, Hong Kong disease, Biliary obstruction of the Chinese***
- Pigmented stone formation in intrahepatic and extrahepatic bile ducts that are commonly accompanied by **recurrent gram-negative bacterial infections**
- **Biliary Duct Findings**
  - Dilated ducts containing stones and sludge
  - Ductal stones are primarily extrahepatic, are predominantly composed of cholesterol, most often originated in gallbladder
  - All segments of biliary tree may be involved, but lateral segment of left lobe is most often and extensively involved
- Parenchymal atrophy, fatty metamorphosis, duct wall enhancement, segmental parenchymal enhancement, hepatic abscess, biloma, and pneumobilia
- Strictures are suggested by presence of abruptly tapered ducts



Oriental cholangiohepatitis. PTC shows severe stricture (*arrow*), *with dilated ducts, multiple filling defects, and abrupt tapering in the right anterior segment.*



AIDS-related pappilitis. ERCP shows marked dilatation of the common bile duct and pancreatic duct, a finding indicating low obstruction.

2008

- Choledochocele, which is true
  - A. Type II 80-90%,
  - B. not asssoc w ca,
  - C. 30% will get pancreatitis,
  - D. males > females,
  - E. most diagnosed after 15
- Duke 2008 Version
- What is true of choledochal cyst (new)?
  - Type II make up 80-90% of cases
  - No inc. risk of cholangiocarcinoma
  - Most in males
  - Most diagnosed in patients >15 years old

2008

- Choledochocele, which is true
  - A. Type II 80-90%, - **False it is Type 1**
  - B. not asssoc w ca, - **False, it is**
  - C. 30% will get pancreatitis, - couldn't find a percentage but there are some case reports
  - D. males > females, - **True**
  - E. most diagnosed after 15- **False, most are diagnosed before 10.**
- Duke 2008 Version
- What is true of choledochal cyst (new)?
  - Type II make up 80-90% of cases- **False**
  - No inc. risk of cholangiocarcinoma- **False**
  - Most in males- **True**
  - Most diagnosed in patients >15 years old- **False**

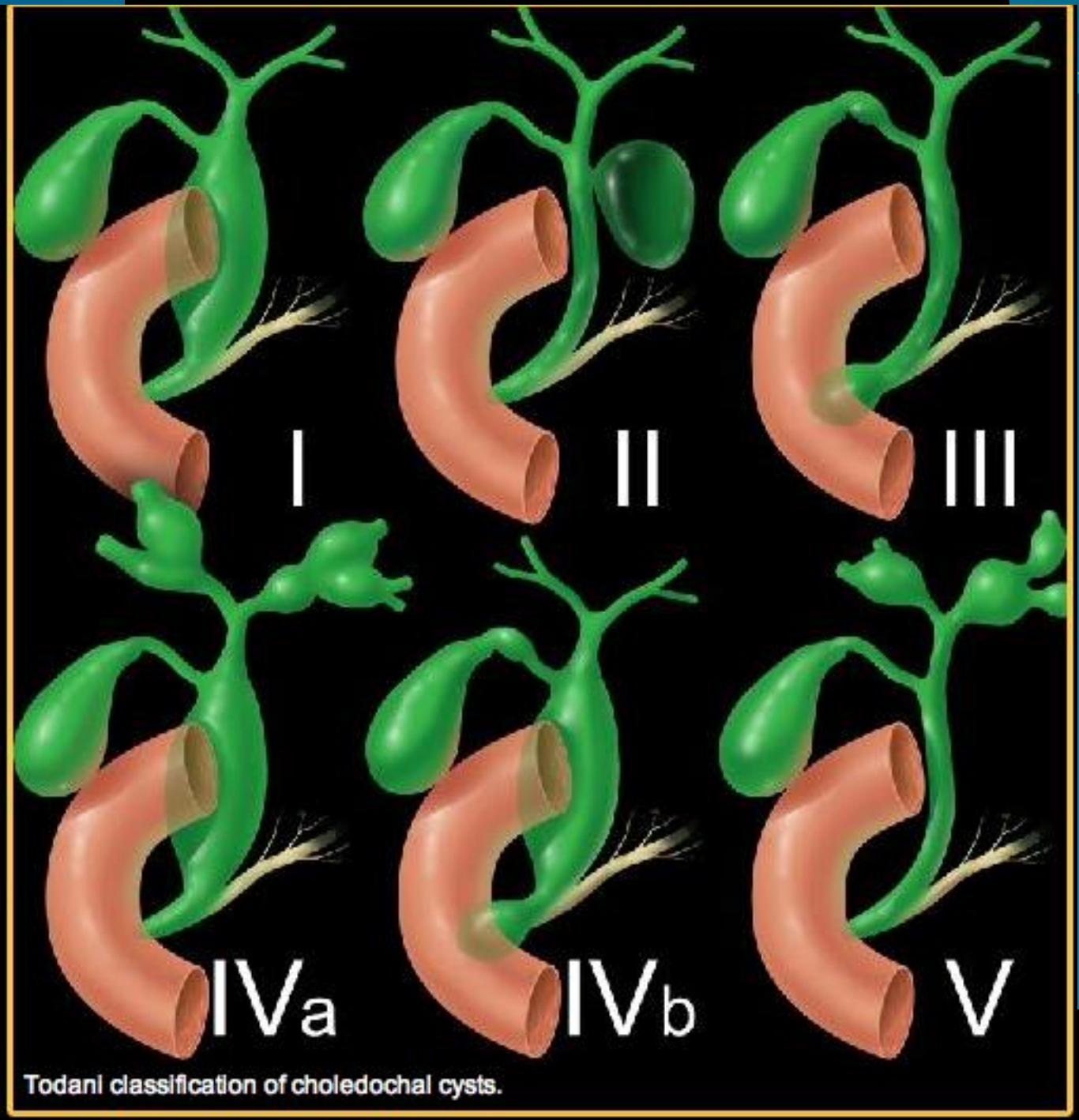
Choledochal Cyst

- Cystic dilatation of extrahepatic bile duct
- mc congenital lesion of the CBD
- Age: <10 yrs (60%) + young adulthood; 80% diagnosed in childhood, 7% during pregnancy; occasionally detected up to 8th decade;
- M:F= 1:4

Dahnert

Choledochal Cysts

- Mc manifestation is cystic dilatation of the entire common bile duct (type 1A) – GI Requisites pg 235
- Type I cysts are the most common and represent 80-90% of choledochal cysts. They consist of saccular or fusiform dilatations of the common bile duct, which involve either a segment of the duct or the entire duct.
  - Type IA is saccular in configuration and involves either the entire extrahepatic bile duct or the majority of it.
  - Type IB is saccular and involves a limited segment of the bile duct.
  - Type IC is more fusiform in configuration and involves most or all of the extrahepatic bile duct.
- Type II choledochal cysts appear as an isolated diverticulum protruding from the wall of the common bile duct. The cyst may be joined to the common bile duct by a narrow stalk.
- Type III choledochal cysts arise from the intraduodenal portion of the common bile duct and are described alternately by the term choledochocele.
- Type IVA cysts consist of multiple dilatations of the intrahepatic and extrahepatic bile ducts.
- Type IVB choledochal cysts are multiple dilatations involving only the extrahepatic bile ducts.
- Type V (Caroli disease) consists of multiple dilatations limited to the intrahepatic bile ducts.



Todani classification of choledochal cysts.

2008

- Imaging of liver in child
  - Phenobarbital
  - CCK
  - cimetidine

2008

- Imaging of liver in child
  - **Phenobarbital**
  - CCK
  - cimetidine

Biliary Atresia and Neonatal Hepatitis

- There is some evidence that the examination using 99mTc-IDA analogs is more diagnostic when the liver is primed first with 5-7 days of phenobarbital therapy, 2.5mg/kg orally twice a day, which stimulates better hepatic excretion of the radiopharmaceutical and therefore earlier identification of a patent biliary tree.
- Mettler pg 230

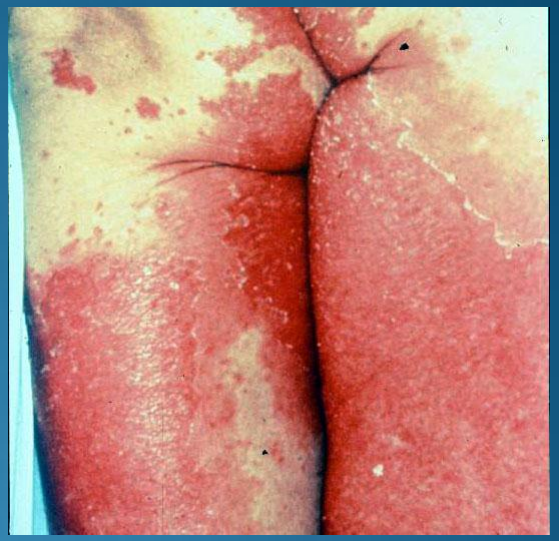
2008

- Necrolytic erythema migrans (recall):
  - Associated with gastrinoma
  - Glucagonoma
  - Somatostatinoma
  - Insulinoma

2008

- Necrolytic erythema migrans (recall):
  - Associated with gastrinoma
  - **Glucagonoma**
  - Somatostatinoma
  - Insulinoma

Glucagonoma and Necrolytic erythema migrans



- alpha cell tumor of the pancreas;
- occasionally no neoplasm found
- abdomen, thighs and buttocks
- patchy erythema with flaccid vesicles and bullae
- glossitis, angular cheilitis, normocytic anemia, low amino acid levels in serum
- **Glucagonoma gives rise to syndrome: migratory necrolytic erythema, angular stomatitis, cheilitis, and atrophic glossitis**
- **Glucagonoma is a malignant tumor in over 60% of patients at the time of diagnosis; usually found in the tail of the pancreas**
- **Glucagonoma- hypervascular in 90%, solid + necrotic components, 50% have liver mets at time of diagnosis**

2008

- Metabolic syndromes increased risk for
  - Hepatic adenomas

Hepatic Adenoma

- Most frequent hepatic tumor in young women after use of contraceptive steroids
- Age: young women in childbearing age: not seen in males unless on anabolic steroids; rare in children
- Associated with: oral contraceptives (2.5x risk after 5 yr use, 7.5 x risk after 9 yr use, 25 x risk >9 year use), steroids, pregnancy, diabetes mellitus, type Ia glycogen storage disease (von Gierke) in 60%, Fanconi anemia
- **Hepatic adenomas are seen frequently in women. They are associated with birth control pills. Less commonly, they are seen in patients with glycogen storage disease or men taking anabolic steroids.- ImagingConsult**

Dahnert pg 708

2008

- **Pt with splenic vein thrombosis and bleeding gastric varices. You should do: (recall)**
  - A. Splenorenal shunt
  - B. Mesocaval shunt
  - C. Portocaval shunt
  - D. Spleno-? Shunt
  - E. Splenectomy

2008

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2008

- 7cm HCC near porta hepatis in cirrhotic liver w/ portal HTN. What's the best step in management (new)?
  - A. radiofrequency ablation
  - B. hepatic artery embolization
  - C. orthotopic liver transplant
  - D. cryoablation,
  - E. liver resection

2008

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HCC and Treatment
AJR 2003 180: 1015-1022

- Any extrahepatic disease is a contraindication for surgery
- Tumors should have at least a 1-cm margin from the adjacent vessels for segmentectomy or lobectomy.
- Because satellite nodules and portal vein tumor thrombus are predictors for radiologically occult disease elsewhere in the liver, these findings generally exclude a patient from being considered for treatment with surgical resection
- Given that most patients with hepatocellular carcinoma have underlying cirrhosis, the risk that the remaining liver will not function sufficiently after resection is significant. Surgery can be considered in patients with Child-Pugh class A cirrhosis or with indocyanine green clearance levels of 5 mL/min/kg of body weight or higher
- Preoperative percutaneous transhepatic portal vein embolization of hepatic segments to be resected has been used to induce compensatory hypertrophy of non-embolized liver . When performed several weeks before surgery, this treatment may optimize hepatic reserve in patients undergoing partial hepatectomy.
- Liver transplantation is considered the definitive treatment for hepatocellular carcinoma because this procedure removes the risk of hepatocellular carcinoma developing from occult disease left behind or new tumors arising from dysplastic nodules in the remaining cirrhotic liver. Any extrahepatic disease is a contraindication to transplantation, and the maximal tumor burden should be a single lesion smaller than 5 cm or fewer than three lesions with each lesion being smaller than 3 cm

HCC and Treatment

- Milan Criteria for Transplantation
  - no evidence of extrahepatic tumor
  - unifocal tumor mass < 5 cm in diameter
  - or multifocal tumors < 4 in number, each < 3 cm in diameter
- RFA (Valji- pg 298)
  - Ideal candidates have 3 to 4 or fewer lesions
  - All of which are <5.0 cm in diameter
  - Major contraindication for the percutaneous approach is location of the lesion contiguous with a sensitive organ (colon, GB, stomach)
- TACE pt selection (Valji pg 301)
  - Is suitable for pts with large HCC burden
  - Excluded on the basis of extrahepatic metastases, unresolved biliary obstruction or malignant ascites
  - Portal vein thrombosis is no longer considered an absolute contraindication to the procedure

2008

- Partially separates the right and left hepatic loves
  - A. Falciform ligament
  - B. Gb fossa
  - C. Ligamentum venosum
  - D. RHV
- Duke Version 2008
  - What separates right hepatic from left hepatic lobe (new)?
    - A. Right portal vein
    - B. Right hepatic artery
    - C. Lig venosum
    - D. Falciform ligament
    - E. Gallbladder fossa
  - (middle hepatic vein was NOT a choice)

2008

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    - E. **Gallbladder fossa**
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Anatomic Landmarks and Hepatic Segments

- The hepatic veins can be useful in placing an abnormality within a segment
- The Right Hepatic Vein separates the anterior and posterior segments of the right hepatic lobes
- The Middle Hepatic Vein separates the anterior segment or the right hepatic lobe from the medial segment of the left hepatic lobe
- The Left Hepatic Vein separates the medial and lateral segments of the left hepatic lobe
- Like the Middle Hepatic Vein, the gallbladder separates the anterior segment of the right lobe and the medial segment of the left lobe
- The ligamentum teres separates the medial and lateral segments of the left hepatic lobe

2008

- Pancreatic cancer not resectable if
  - Liver mets
  - Colon invasion
  - Lung mets
  - Proximal PV
  - Prox Sma
- Duke Version 2008
  - Not a contraindication to surgical resection of pancreatic cancer (new)?
    - Short segment involvement of SMA
    - Short segment involvement of portal vein
    - Mets to liver
    - Mets to lung
    - Colon invasion

2008

- Pancreatic cancer not resectable if
  - Liver mets- **True**
  - Colon invasion- **True**
  - Lung mets- **True**
  - Proximal PV- if involvement- True
  - Prox Sma- if involvement- True
- Duke Version 2008
  - Not a contraindication to surgical resection of pancreatic cancer (new)?
    - Short segment involvement of SMA- tumor may only abut and not more than 180 degrees of the SMA
    - **Short segment involvement of portal vein- at the confluence of the SMV and PV**
    - Mets to liver- contraindication
    - Mets to lung- contraindication
    - Colon invasion- contraindication

Pancreatic Cancer Resectability

- critical aspects that need to be evaluated in a thorough radiographical assessment of a potentially resectable pancreatic cancer
  - the presence or absence of peritoneal or hepatic metastases;
  - the patency of the superior mesenteric vein and portal vein and
  - the relationship of these vessels and their tributaries to the tumor;
  - the relationship of the tumor to the superior mesenteric artery, celiac axis, hepatic artery, and gastroduodenal artery; and
  - the presence of any aberrant vascular anatomy
- Standard criteria for resection include
  - the absence of distant metastases,
  - limited mesenteric venous involvement
  - with patency of the portal vein and superior mesenteric vein, and
  - no evidence of major arterial encasement.
- borderline-resectable pancreatic cancer. Criteria for this group of patients include
  - encasement of a short segment of the hepatic artery without evidence of tumor extension to the celiac axis;
  - tumor abutment of the superior mesenteric artery involving <180° of the artery circumference; and
  - short-segment occlusion of the superior mesenteric vein/portal vein confluence beneath the neck of the pancreas.

Annals of Surgical Oncology 13:1019-1020 (2006)© 2006 Society of Surgical Oncology

Borderline Resectable Pancreatic Cancer: A New Classification for an Old Challenge

2008

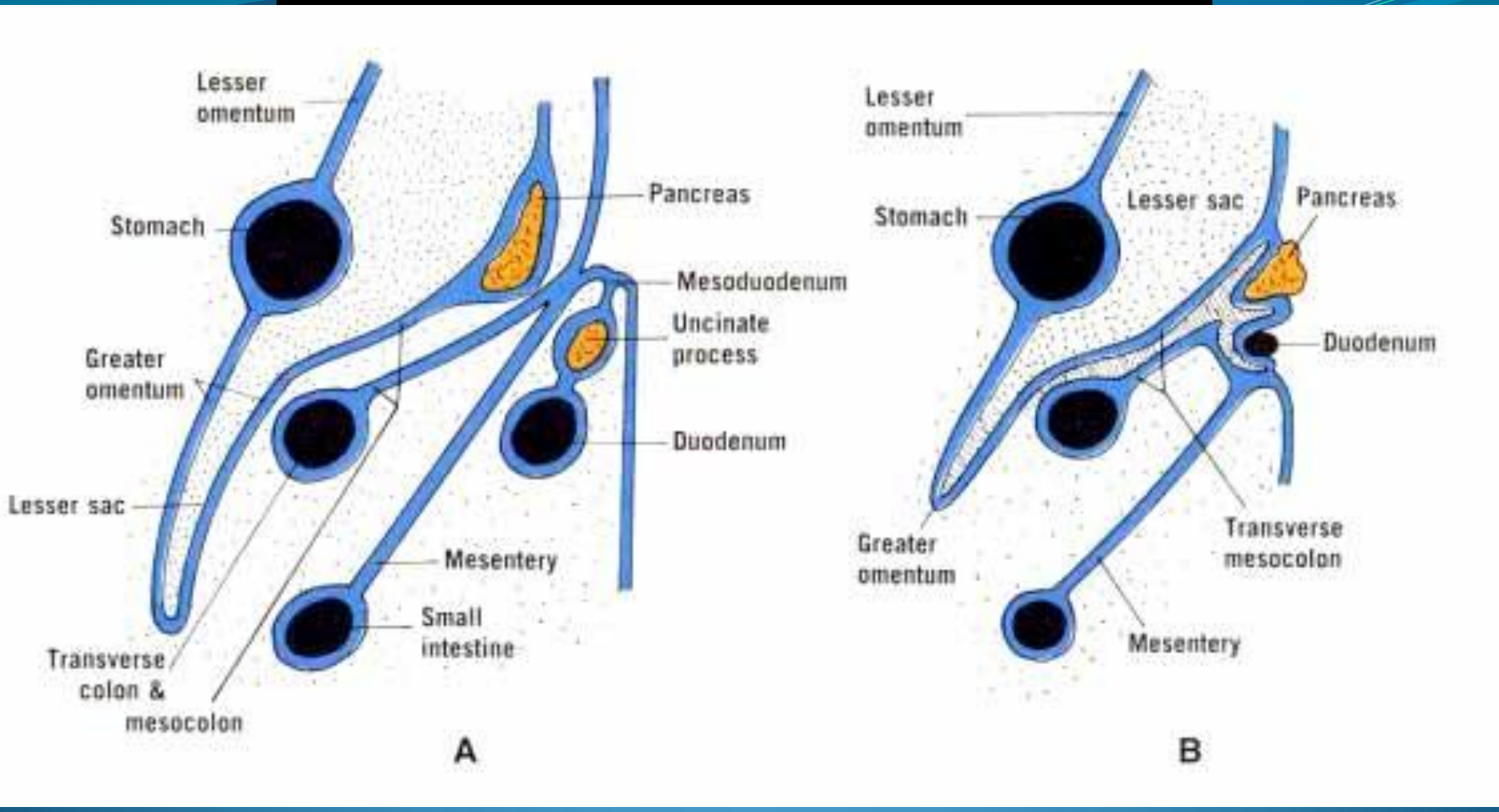
- Lesser sac communicates with
  - Left anterior hepatic
  - Right hepatorenal
  - Right paracolic gutter
  - Left subphrenic
  - Left posterior hepatic
- Duke Version-
  - Lesser sac freely communicates with what intraperitoneal space (new)?
  - Posterior right perihepatic
  - Anterior right perihepatic
  - Right hepatorenal space
  - Left subphrenic space
  - Rigth subphrenic space

2008

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Lesser Sac

- Aka omental bursa
- Is the smaller part of the peritoneal cavity that lies posterior to the stomach, lesser omentum, and adjacent structures
- The omental bursa permits free movement of the stomach on adjacent structures because the anterior and posterior walls of the omental bursa slide smoothly over each other
- The omental bursa has two recesses
  - A superior recess which is limited superiorly by the diaphragm and the posterior layers of the coronary ligament of the liver
  - An inferior recess btw the superior part of the layers of the greater omentum
- The omental bursa communicates with the greater sac through the omental foramen (epiploic foramen), an opening situated posterior to the free edge of the lesser omentum forming the hepatoduodenal ligament


Lesser omentum
Stomach
Pancreas
Mesoduodenum
Uncinate process
Greater omentum
Duodenum
Lesser sac
Mesentery
Small intestine
Transverse colon & mesocolon
A
Lesser omentum
Stomach
Lesser sac
Pancreas
Duodenum
Transverse mesocolon
Greater omentum
Mesentery
B

Peritoneal Cavity and Spaces

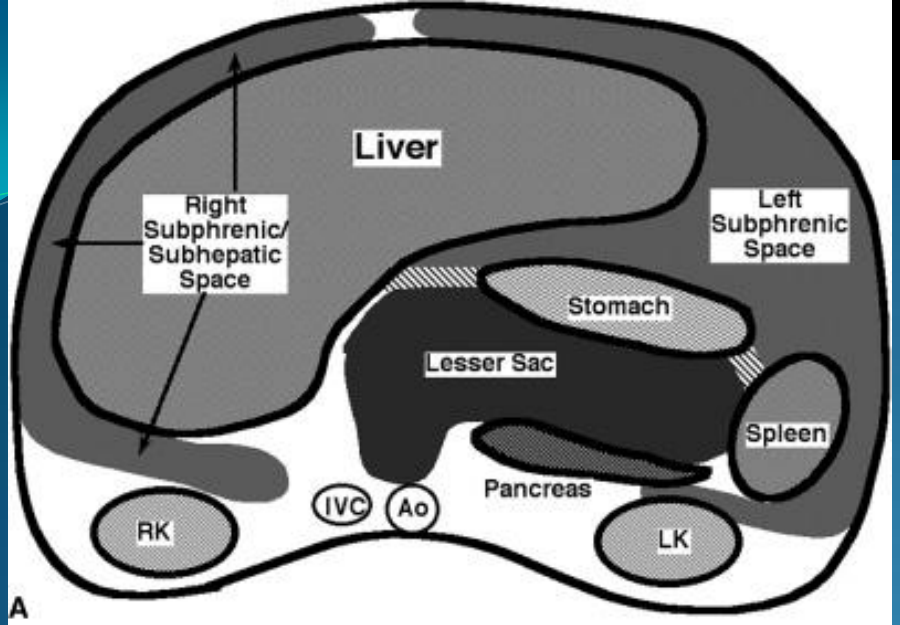
- Right subphrenic space
  - Communicates around the liver with the anterior subhepatic and posterior subhepatic (Morison's) Space
- Left Subphrenic Space
  - Communicates freely with the left subhepatic space
- The falciform ligament separates the right and left subphrenic spaces, and they do not communicates directly
- The right subphrenic and subhepatic spaces communicates freely with the pelvic peritoneal cavity by means of the right paracolic gutter

- The peritoneal cavity is divided into the greater peritoneal cavity and the lesser peritoneal cavity (the lesser sac)
- The **right subphrenic space communicates around the liver with the anterior subhepatic and posterior subhepatic space (Morison pouch).**
- **The Morison pouch (the right hepatorenal fossa) is the most dependent portion of the abdominal cavity in a supine patient, and it collects ascites, hemoperitoneum, metastases, and abscesses.**
- **The right subphrenic and subhepatic spaces communicate freely with the pelvic peritoneal cavity via the right paracolic gutter.**

- Morison Pouch (R Hepatorenal Fossa)
  - In a supine pt= most dependent portion of the abdominal cavity
  - Formed by the R subhepatic recess and the hepatorenal recess
  - Communicates with the subphrenic recess, the lesser sac via the epiploic foramen and the R paragolic gutter and therefore the pelvic cavity

- The **left subphrenic space communicates freely with the left subhepatic space, but it is separated from the right subphrenic space by the falciform ligament and from the left paracolic gutter by the phrenicocolic ligament.**
- **The left subphrenic (perisplenic) space distends with fluid from ascites and with blood from splenic trauma. It is a common location for abscesses and for disease processes of the tail of the pancreas.**
- **The left subhepatic space (gastrohepatic recess) is affected by diseases of the duodenal bulb, lesser curve of the stomach, gallbladder, and left lobe of the liver.**

- The lesser omentum, composed of the gastrohepatic and hepatoduodenal ligaments, suspends the stomach and duodenal bulb from the inferior surface of the liver.
- The lesser omentum separates the gastrohepatic recess of the left subphrenic space from the lesser sac
- The lesser omentum transmits the coronary veins (which dilate as varices) and contains lymph nodes (which enlarge with involvement by gastric carcinoma and lymphoma).
- The lesser sac is the isolated peritoneal compartment between the stomach and the pancreas. It communicates with the rest of the peritoneal cavity (the greater sac) only through the small foramen of Winslow.
- The greater omentum is a double layer of peritoneum
- The retroperitoneal space between the diaphragm and the pelvic brim is divided into anterior pararenal, perirenal, and posterior pararenal compartments by the anterior and posterior renal fascia
- The anterior pararenal space extends between the posterior parietal peritoneum and the anterior renal fascia. It is bounded laterally by the lateral conal fascia. The pancreas, duodenal loop, and ascending and descending portions of the colon are within the anterior pararenal space. Disease in the anterior pararenal space usually originates from these organs (pancreatitis, perforating/penetrating ulcer, diverticulitis).



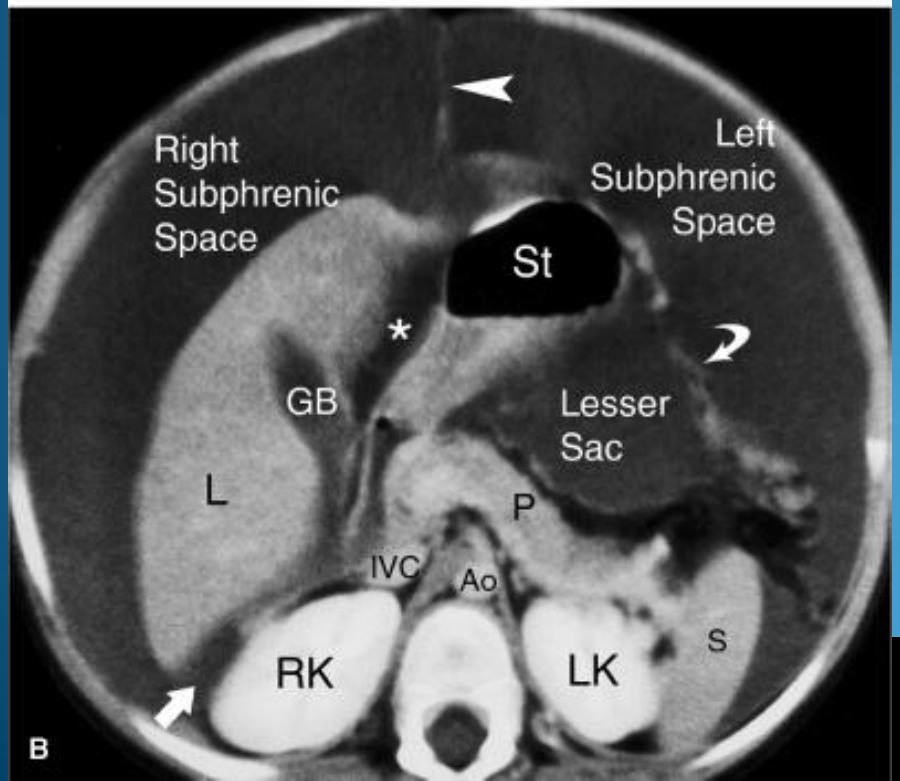
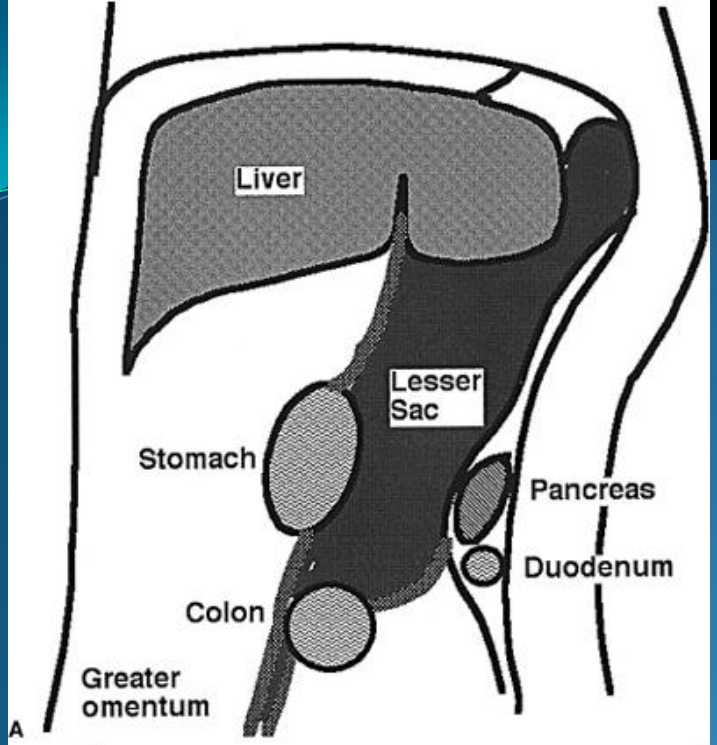
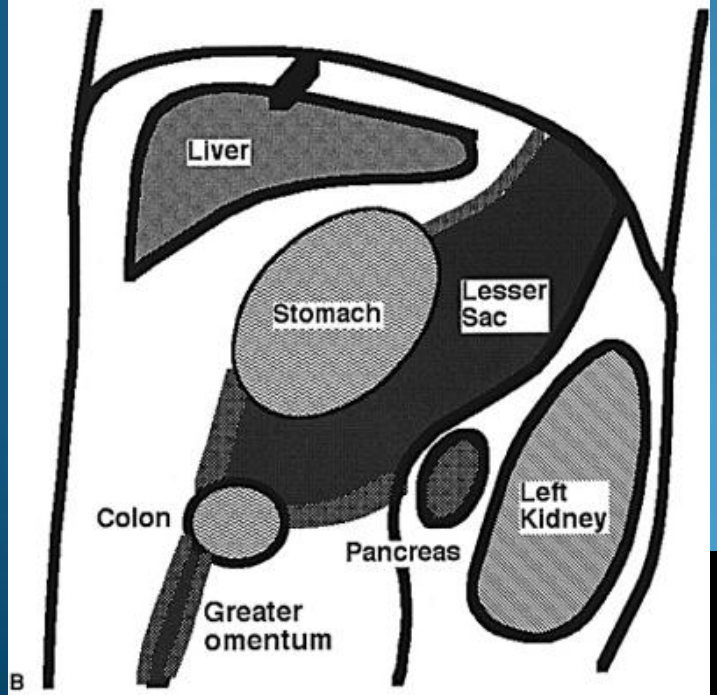
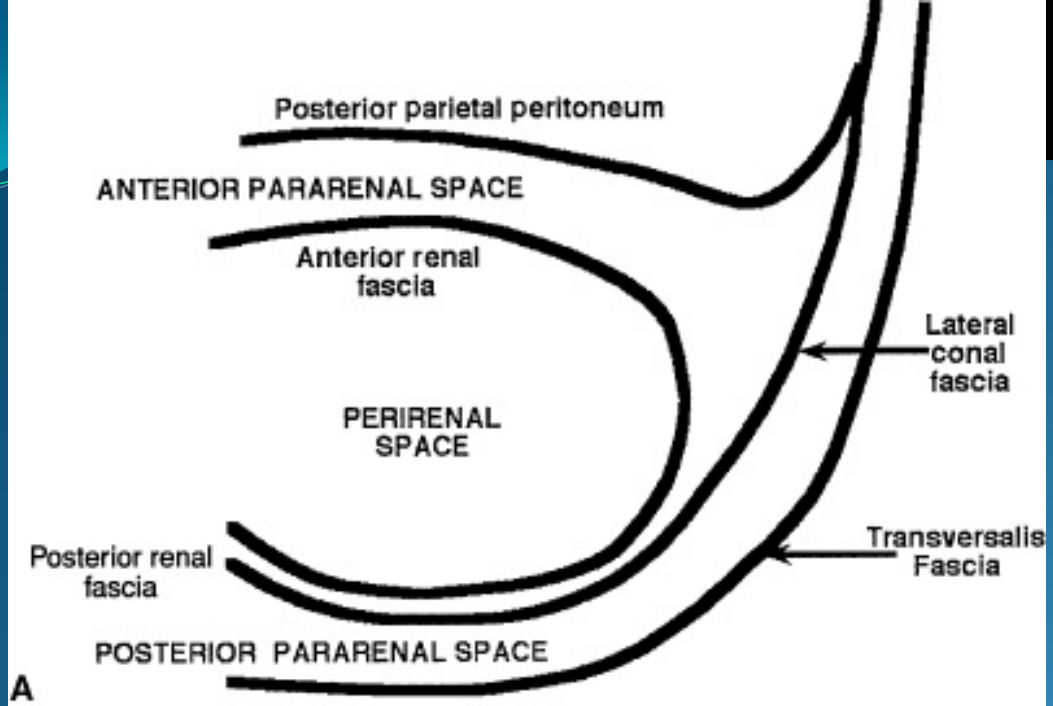


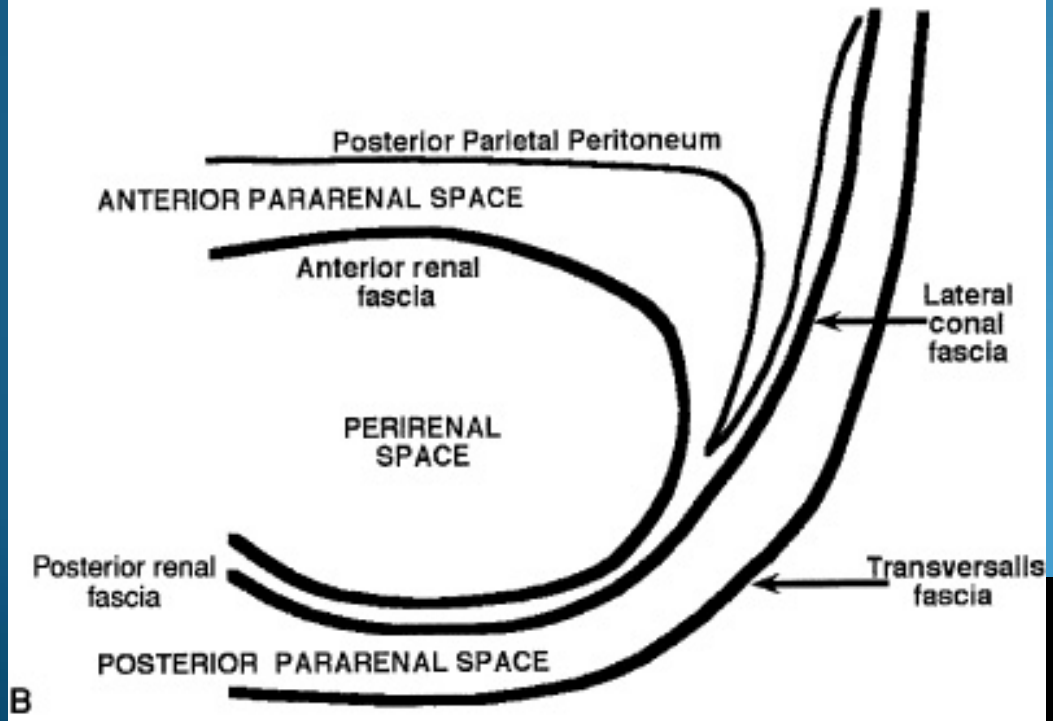
Diagram of an axial cross section of the abdomen illustrates the recesses of the greater peritoneal cavity and the lesser sac. **B. CT scan of a patient with a large amount of ascites nicely demonstrates the recesses of the greater peritoneal cavity and the lesser sac. The lesser sac is bounded by the stomach (St) anteriorly, the pancreas (P) posteriorly, and the gastrosplenic ligament (*curved arrow) laterally. The falciform ligament (arrowhead) separates the right and left subphrenic spaces. Fluid from the greater peritoneal cavity extends into the Morison pouch (arrow) between the liver and the right kidney. Fluid in the gastrohepatic recess (asterisk) separates the stomach from the liver (L). S, spleen; GB, gallbladder; RK, right kidney; IVC, inferior vena cava; Ao, aorta; LK, left kidney.**





The Lesser Sac. Sagittal plane diagrams of the medial (A) and lateral (B) aspects of the lesser sac illustrate its position posterior to the stomach and anterior to the posterior parietal peritoneum covering the pancreas. Note that projections of the lesser sac extend to the diaphragm, resulting in the potential for disease processes in the lesser sac to cause pleural effusions. The coronary ligaments reflect between the liver and the diaphragm producing a bare area of liver not covered by peritoneum





Retroperitoneal Compartmental Anatomy. Diagrams illustrate two normal variations of the reflections of the posterior parietal peritoneum around the descending colon. In (A) the colon is entirely retroperitoneal, and in (B) the peritoneum forms a deep pocket lateral to the colon, allowing intraperitoneal fluid to extend far posteriorly. Fluid or disease processes in the anterior pararenal space from the pancreas or colon may also extend posteriorly to the kidney by separating the two layers of the posterior renal fascia.

2008

- Regarding paraduodenal hernia
  - Less common than transmesenteric hernia
  - Pushes IMV posteriorly
  - Left goes through foramen of Winslow,
  - Intestinal loops behind tail of pancreas
  - Occurs b/c of cong something
- Duke Version -- Regarding paraduodenal hernias (new):
  - Less common than congenital
  - Congenital defects of transverse mesocolon
  - Enter foramen of Winslow
  - goes into fossa of Lanzert
  - posterior to pancreas
  - displaces SMV anteriorly

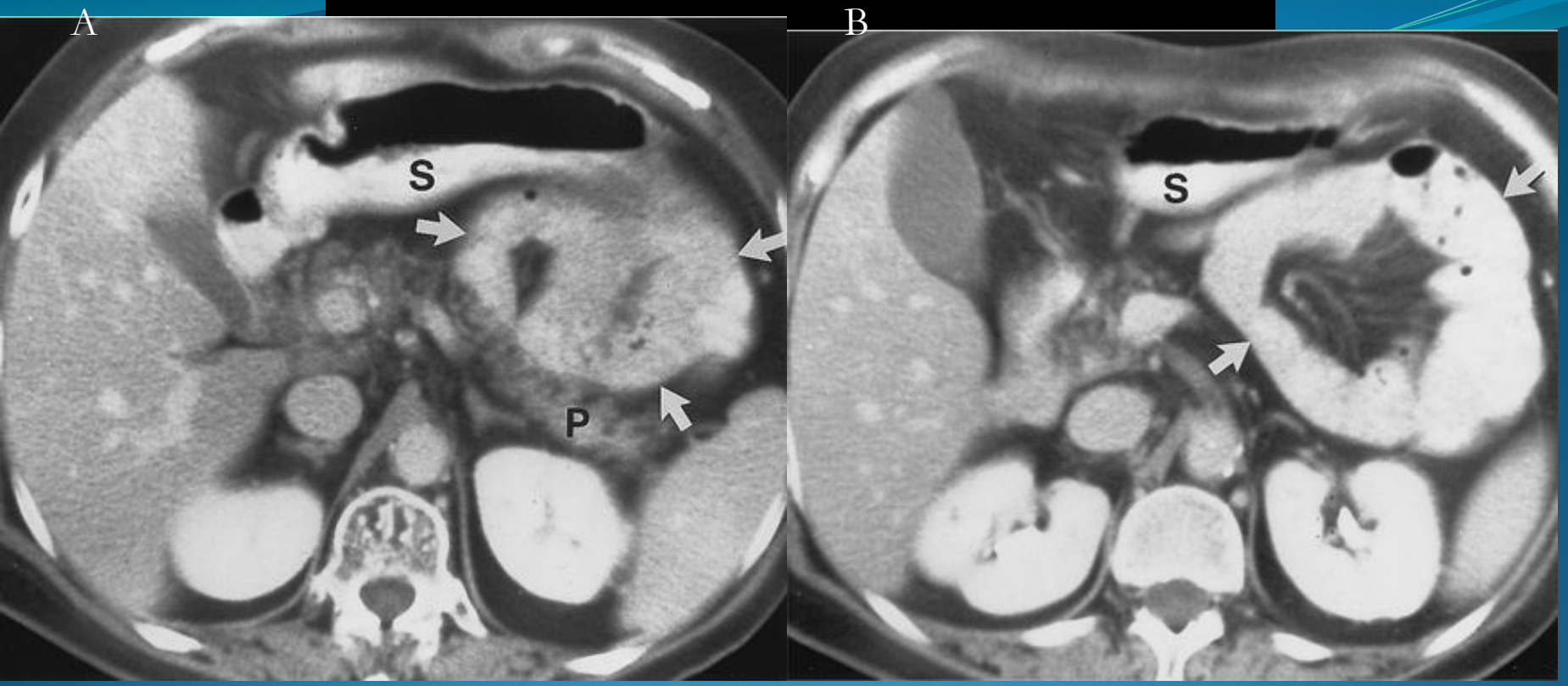
2008

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  - displaces SMV anteriorly

Paraduodenal Hernia

- = congenital defect in descending mesocolon
- Frequently asymptomatic
- **Left through fossa of Landzert (75%)**
  - Location
    - To the left of 4th portion of duodenum at duodenujejunal jx (paraduodenal fossa = confluent zone of descending mesocolon + transverse mesocolon + small bowel mesentery
    - Cluster of dilated small bowel loops btw pancreas and stomach
    - Displacement of gastric wall anteriorly
    - Displacement of duodenojejunal flexure + transverse colon inferiorly
    - Engorged crowded vessels at entrance of hernia sac
  - CT
    - Encapsulated bowl loop displacing the inferior mesenteric vein (+ landmark of the right margin of the descending mesocolon) anterolaterally
- **Right through mesentericoparietal fossa of Waldeyer (25%)**
  - Predisposed: nonrotation of small bowel
  - Location: behind the root of small bowel mesentery caudal to SMA and inferior to 3rd portion of duodenum on the right side
  - CT
    - Encapsulated bowel loop displacing the right colic vein (=landmark of the left margin of the ascending mesocolon) anteriorly
    - Looping of small intestine behind SMA + SMV below transverse portion of duodenum
    - SMV located ventral + to left of SMA
    - Absence of normal horizontal duodenum

Dahnert pg 792



Left-sided paraduodenal hernia in a 55-year-old man with chronic abdominal pain. **(a) Transverse CT scan through the upper abdomen shows a saclike mass of jejunal loops (arrows) in the left upper quadrant interposed between the pancreas *(P) and stomach (S). (b) CT scan at a lower level shows that the encapsulated cluster of jejunal loops (arrows) causes indentation of the posterior wall of the stomach (S). The mesenteric vessels within the hernia appear somewhat crowded and engorged.***

2008

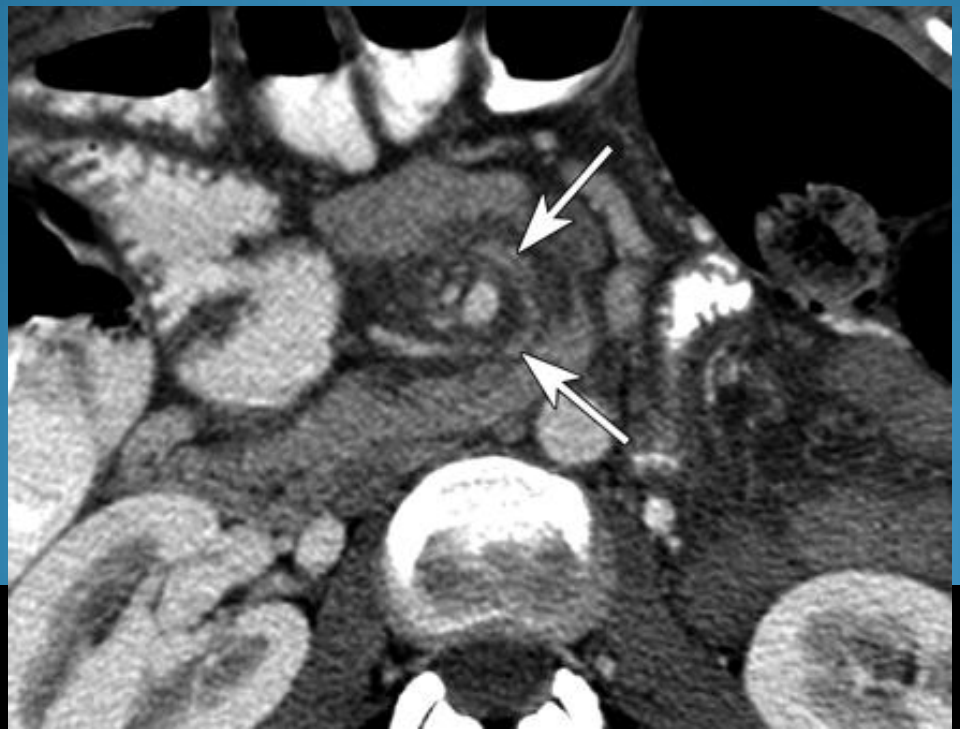
- Compared to open gastric bypass, laparoscopic bypass has higher incidence of (recall)?
  - Wound infection
  - Splenic injury
  - Internal hernia
  - Incisional hernia

2008

- Compared to open gastric bypass, laparoscopic bypass has higher incidence of (recall)?
  - Wound infection
  - Splenic injury
  - **Internal hernia**
  - Incisional hernia

C. Internal hernia

- Swirling of the mesentery was the best-performing single sign in our series, AJR



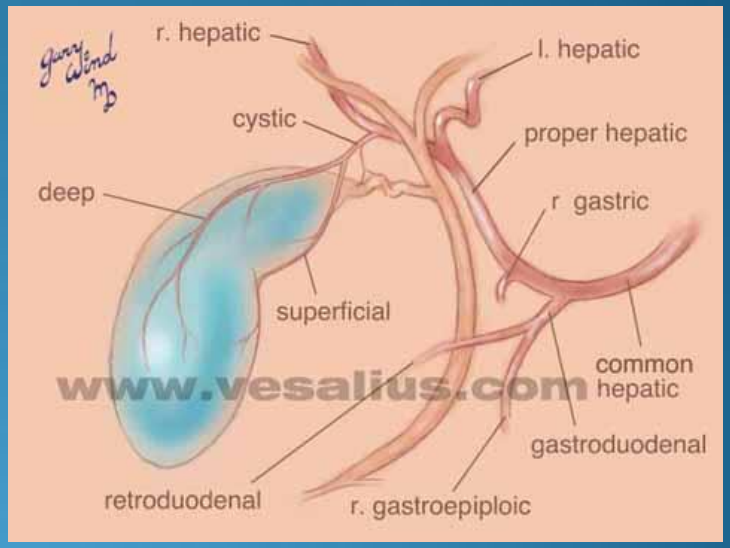
- Per “Radiology: Gastrointestinal Complications of Laparoscopic Roux-en-Y Gastric Bypass Surgery: Clinical and Imaging Findings1” Major complications.—Of 463 patients, 44 (9.5%) had 56 major GI complications. There were 21 (4.5%) patients with 23 bowel obstructions, 14 (3.0%) patients with 16 major leaks, 15 (3.2%) patients with 15 anastomotic strictures, and one patient each with gastrogastric and gastrocutaneous fistulas. And of the 23 SBO, there were 13 pts with 14 internal hernias.
- This article suggests that the most common complication was SBO and that internal hernias were quite uncommon. It is true that internal hernias are more common in lap then open procedures.
- According to Archives of Surgery paper 3464 cases of lap, stomal stenosis was the most common complication and then bowel obstruction.

2008

- Cystic artery arises from (new):
  - A. Left hepatic artery
  - B. Right hepatic artery
  - C. GDA

2008

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  - A. Left hepatic artery
  - B. **Right hepatic artery**
  - C. GDA



2008

- Which is the bleeder in Mallory Weiss (recall)?
  - A. Left gastric
  - B. Left phrenic
  - C. Splenic
  - D. Common hepatic

2008

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  - A. **Left gastric**
  - B. Left phrenic
  - C. Splenic
  - D. Common hepatic

Left gastric artery

- Prophylactic embolization of the LGA without prior documented bleeding is advocated because almost 90% of the patients with this condition survive if the bleeding is controlled. The left gastric artery is involved in 85% of the cases of UGIB. (and Mallory-Weiss tear one of the most common causes of UGIB).
- UGIB occurs from a variety of etiologies. The pathophysiology of the bleeding is often mucosal erosion with subsequent hemorrhage. About 90% of the cases of UGIB arise from Mallory-Weiss tears, variceal hemorrhage due to portal hypertension, peptic ulcer disease, and gastritis.

2008

- Which of the following is most commonly associated with glycogen storage disease (recall)?
  - Hepatic cell adenomas
  - HCC
  - FNH

2008

- Which of the following is most commonly associated with glycogen storage disease (recall)?
  - **Hepatic cell adenomas**
  - HCC
  - FNH

2008

- Imaging may reveal hepatic adenoma, which may become malignant. Emedicine Glycogen Storage Disease
- Hepatic adenomatosis is a well-known complication of glycogen storage disease type Ia (von Gierke disease)

2008

- Most likely calcified liver met (new):
  - Breast Ca
  - Colon
  - Lung

2008

- Most likely calcified liver met (new):
  - Breast Ca
  - **Colon**
  - Lung

- mucinous colorectal metastases are the most common

HEPATIC CALCIFICATION

Radiologic Clinics of North America - Volume 36, Issue 2 (March 1998)

2008

- What is not a cause of presinusoidal portal hypertension (new)?
  - AV fistula
  - Hepatic fibrosis
  - Hepatic vein stenosis
  - Portal vein thrombosis

2008

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  - AV fistula
  - Hepatic fibrosis
  - **Hepatic vein stenosis**
  - Portal vein thrombosis

Causes of Portal HTN

Presinusoidal

Prehepatic

- Splenic AV fistula
- Splenic or portal vein thrombosis
- Massive splenomegaly

Intrahepatic

- Sarcoidosis
- Schistosomiasia
- Nodular regenerative hyperplasia
- Congenital hepatic fibrosis
- Idiopathic portal fibrosis
- Early primary biliary cirrhosis
- Chronic active hepatitis
- Myeloproliferative disorders
- Graft vs Host disease

Causes of Portal HTN

- Sinusoidal & Intrahepatic
  - Established cirrhosis
  - Alcoholis Hepatitis

Causes of Portal HTN

- Post Hepatic/ Post Sinusoisal
  - Budd Chiari Syndrome
  - Membranous IVC web
  - Right heart failure
  - Constrictive pericarditis

- Which of the following is not associated with VHL (recall)?
  - AML
  - Islet cell tumors
  - Renal cysts
  - Pancreatic cysts

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  - **AML**
  - Islet cell tumors
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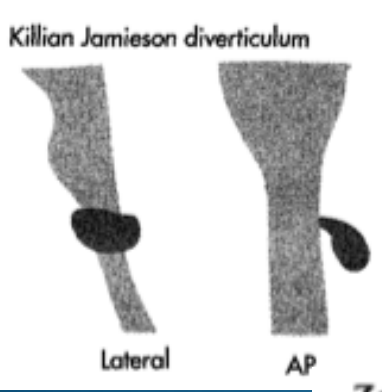
Von Hippel Lindau Manifestions

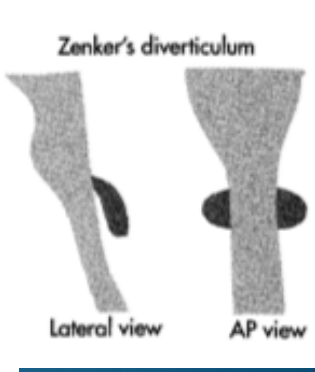
- Retinal and CNS (cerebellar, medullary & spinal cord) hemangioblastomas
- Endolymphatic sac tumor: Papillary cystadenoma
- Renal: cysts and renal cell carcinoma
- Adrenal: Pheochromocytoma
- Pancreas: cysts, serous cystadenoma, islet cell tumor, adenocarcinoma, hemangioblastoma
- Liver cysts, papillary cystadenoma of epididymis and broad ligament (rare)

StatDx

- What is posterior and above cricopharyngeus (recall)?
  - Zenker's
  - Killian Jamieson
  - Traction diverticulum
  - Epiphrenic diverticulum

- What is posterior and above cricopharyngeus (recall)?
  - **Zenker's**
  - Killian Jamieson-lateral & below cricopharyngeus
  - Traction diverticulum-mid esophagus
  - Epiphrenic diverticulum- distal esophagus





Zenker's diverticulum

Pulsion diverticulum originates in the midline of the posterior wall of the hypopharynx at an anatomical weak point known as Killian's dehiscence (above cricopharyngeus at fiber divergence with inferior pharyngeal constrictor). During swallowing, increased intraluminal pressure forces mucosa to herniate through the wall. The etiology of Zenker's diverticulum is not firmly established, but premature contraction and/or motor incoordination of the cricopharyngeus muscle are thought to play a major role. Complications:

- Aspiration
- Ulceration
- Carcinoma

Killian Jamieson diverticulum

- Below cricopharyngeus
- Off midline
- Lateral to cervical esophagus

Epiphrenic diverticulum

- May occasionally be recognized on chest radiographs by presence of soft tissue mass (often with air fluid level) that mimics a hiatal hernia.
- Large diverticulum can compress the true esophageal lumen, causing dysphagia.

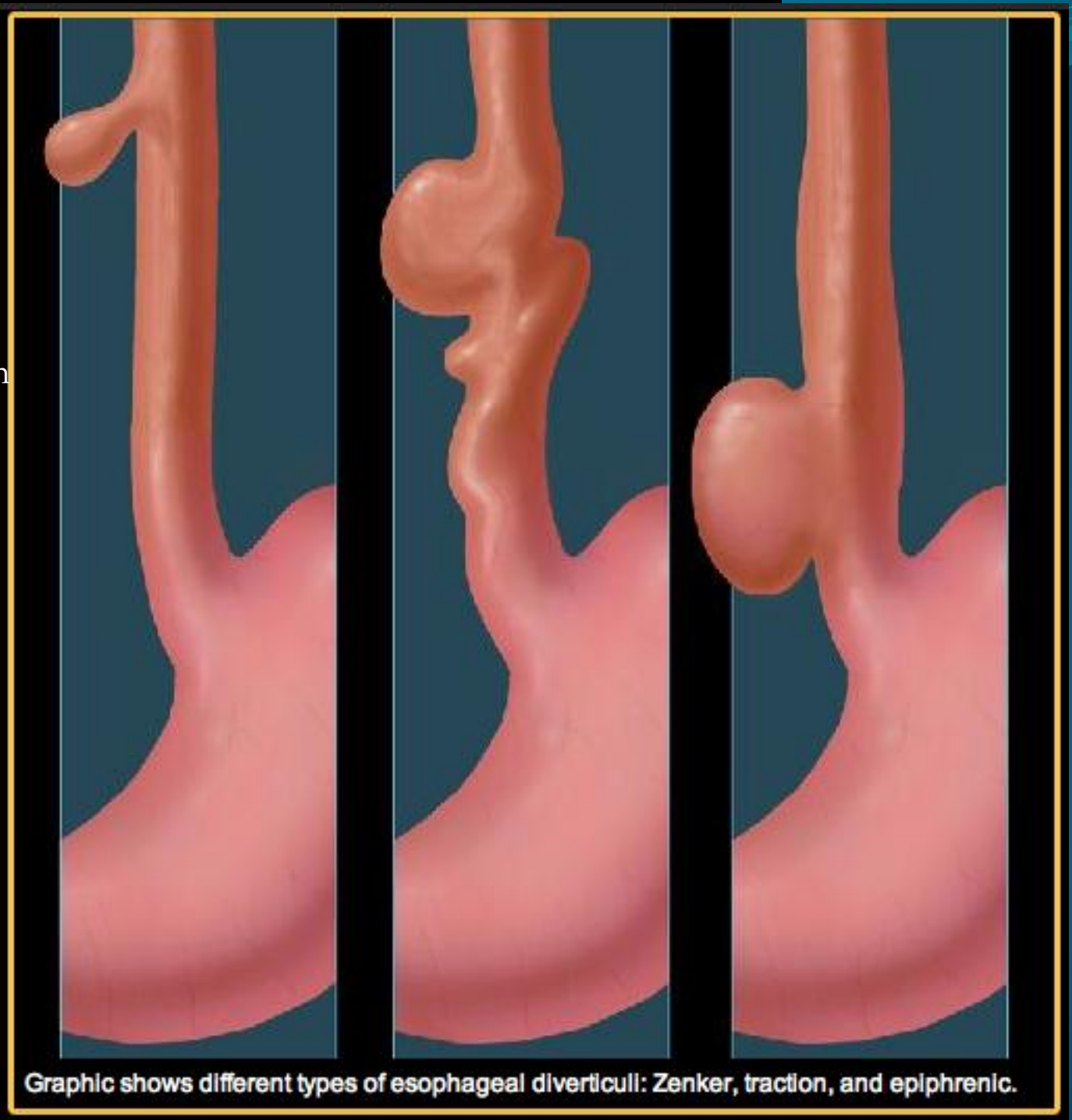
Pseudodiverticulosis

Numerous small esophageal outpouchings representing dilated glands interior to the muscularis. usually after 50 years. Clinical: dysphagia. Underlying diseases: candidiasis, alcoholism, diabetes. Associated findings:

- Esophageal stricture (usually below stricture), 90%
- Esophagitis

Midesophagus=
Traction Diverticuli

Distal Esophagus=
Epiphrenic Diverticulum



- Which cancer after treatment causes pseudocirrhosis (recall)?
  - Breast
  - Lung
  - Prostate
  - Colon

- Which cancer after treatment causes pseudocirrhosis (recall)?
  - **Breast- occurs after treatment for metastatic liver disease with systemic chemotherapy**
  - Lung
  - Prostate
  - Colon

- Acinar filling on ERCP is indicative of which of the following (recall)?
  - chronic pancreatitis
  - Increased risk of post procedural pancreatitis
  - IPMT

- Acinar filling on ERCP is indicative of which of the following (recall)?
  - chronic pancreatitis
  - **Increased risk of post procedural pancreatitis**
  - IPMT

- **Pancreas- The pancreas contains two tissue types: the acini and the islets. The acini produce digestive enzymes, and the islets produce the hormones, insulin, somatostatin, and glucagon.**
- **Injury to Acinar cells leads to pancreatitis**

Branches join the main duct at right-angles. A pancreatogram is obtained when enough contrast is injected to fill the acini. This is undesirable, as it is associated with a higher incidence of post-ERCP complications.

Anatomy for Diagnostic Imaging By Stephanie Ryan, Michelle McNicholas, Stephen J. Eustace

- Regarding hepatic hydrothorax, which of the following is true (recall)?
  - can occur with minimal ascites
  - Left sided
  - Treat with pleurodesis
  - Occurs in other conditions besides cirrhosis

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[redacted]

2007

[redacted]

2007

- **What is the best measurement of the portal venous pressure?**
  - Hepatic wedge pressure
  - Hepatic wedge pressure- free hepatic vein pressure
  - Hepatic wedge pressure + free hepatic vein pressure

2007

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Hepatic Vein Manometry

- Direct measurement of PV pressure rarely is needed for diagnosing portal HTN
- Clinical studies have shown that the hepatic vein wedged (HVW) pressure is equal to PV pressure in most pts
- The intrahepatic portal pressure is expressed as the “hepatic vein pressure gradient (HVPG) or “corrected sinusoidal pressure”: The normal HVPG is less than or equal to 5mm Hg. AN HVPG>5mm is indicative of portal HTN. An HVPG of 12mm or higher is associated with the development of variceal hemorrhage.
- HVPG= WHVP-FHVP (wedge-free hepatic vein pressure)

- **Endometriosis in small bowel resembles:**

  A. Intraperitoneal mets

A. Intraperitoneal mets

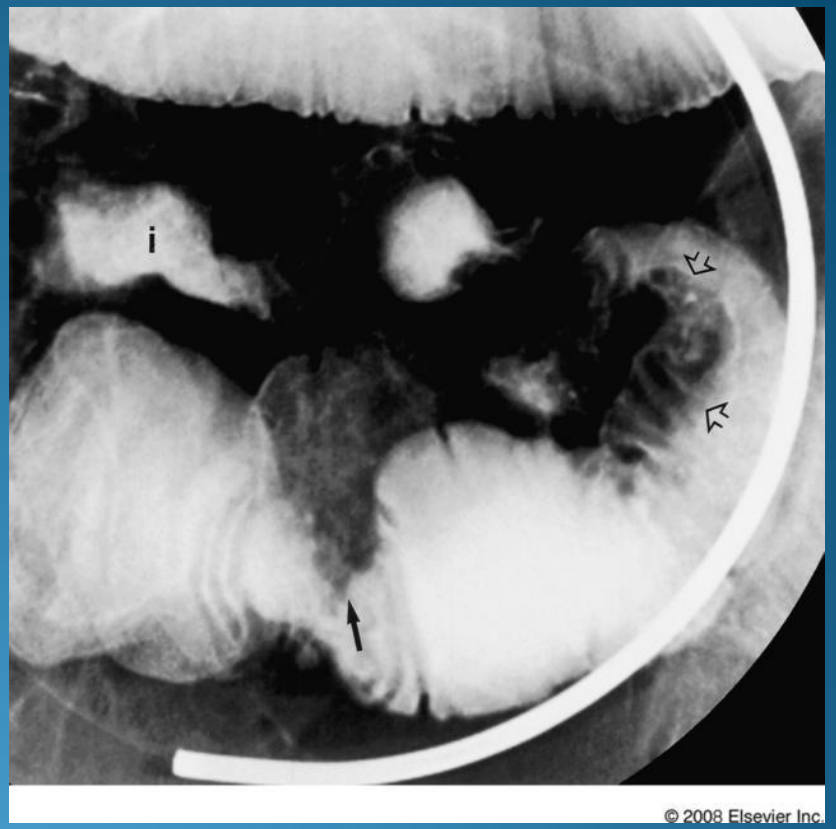
- Three different forms of endometriosis must be considered during laparoscopic visualization: peritoneal implants, endometriomas, and deep infiltrating lesions of the rectovaginal septum.
- medscape

Small Bowel Endometriosis

- Colonic involvement is found in 15-37% of women who undergo surgery for **endometriosis**
- **Ileal involvement is much less frequent, found in only 1-7% of surgical cases**
- **Cyclic pain associated with menses is found in minority of patients (14-40%)**
- **Endometriosis implants in small bowel can mimic findings of carcinoid tumors or intraperitoneal-seeded metastases to bowel on barium studies and CT**
- **Rarely, solitary deposit of ileal endometriosis can mimic a primary carcinoid tumor or appendicitis**
- Focal or multifocal areas of extrinsic mass effect on ileal loops
- Associated with spiculation of **bowel contour and tethering of mucosal folds**
- Circumferential narrowing may be present, but mucosal folds are preservedCan mimic findings of carcinoid tumors or intraperitoneal-seeded metastases to **bowel**


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Ileal endometriosis. Axial CT through the pelvis shows ileal loops (long arrows) pulled toward the mesentery with associated tethering of folds (small arrow). The submucosa has slightly low attenuation.



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Ileal endometriosis. Spot image obtained during enteroclysis shows a focal, smooth, extrinsic mass impression (open arrows) on the mesenteric border of a pelvic loop of ileum. At a second site, there is another focal extrinsic mass impression (arrow) and tethering of folds toward the mesenteric border. The ileal mucosa is preserved. The distal ileum (i) is collapsed. These endometriosis implants in the ileum are indistinguishable from intraperitoneal metastases to the small bowel.

- **HIV esophagitis:**
  - A. Giant ulcers
  - B. Multiple raised plaques
  - C. Small nodular ulcers

- **HIV esophagitis:**
  - A. **Giant ulcers**
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A. Giant ulcers

- Human immunodeficiency virus (HIV) infection of the esophagus has recently been implicated as a cause of giant esophageal ulcers in HIV-positive patients with odynophagia.
  - ***Giant, human immunodeficiency virus-related ulcers in the esophagus.***
  - ***Levine MS*, Radiology**

- **Which of the following of cholangiocarcinoma is true**
  - A. Peripheral intrahepatic cholangiocarcinoma is more infiltrative pattern
  - B. Peripheral intrahepatic chalonagiocarcinoma is pedunctulated
  - C. Hilar cholangiocarcinoma has a tendency to be infiltrative
  - D. Extrahepatic cholangiocarcinoma is commonly a lobulated mass

- **Which of the following of cholangiocarcinoma is true**
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  - **C. Hilar cholangiocarcinoma has a tendency to be infiltrative**
  - D. Extrahepatic cholangiocarcinoma is commonly a lobulated mass

C. Hilar cholangiocarcinoma has a tendency to be infiltrative

- Hilar cholangiocarcinoma has remained a challenge to surgeons because of its propensity for local invasion and its proximity to the portal vein, hepatic arteries, and liver parenchyma.
  - Management of Hilar Cholangiocarcinoma, Annals of Surgery
- Large solitary tumors are characteristic of peripheral cholangiocarcinoma; however, a multinodular type may occur. These tumors have a fibrous stroma, are firm and grayish white in color, and are not well vascularized. Hilar cholangiocarcinoma are usually firm, intramural, annular tumors that encircle the bile duct, or may be bulky hard masses that are on the duct or hilar region and extend into the liver. They may also appear as a spongy friable mass in the lumen of the bile duct. There may be metastatic nodules throughout the liver with dilation of bile ducts peripheral to the mass.
  GI and Hep resource center, Johns Hopkins

Cholangiocarcinoma

- Usually adenocarcinoma
- Intrahepatic or extrahepatic
- Intrahepatic cholangiocarcinoma- peripheral or hilar
- 2nd most prevalent liver cancer after HCC
- Associated with- clonorchiasis, intrahepatic stone disease, choledochal cyst, Caroli disease and primary
- A tumor that arises peripheral to the secondary bifurcation of the left or right hepatic duct is considered to be peripheral cholangiocarcinoma
- A tumor that arises from the common hepatic duct is considered to be hilar cholangiocarcinoma (Klatskin tumor)

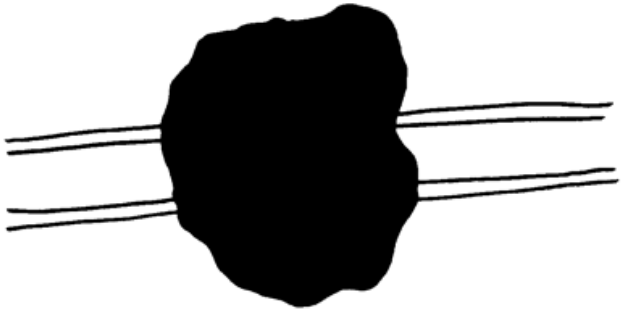
Radiographics. 2001;21:S97-S116,

AJR 2003; 181:819-827

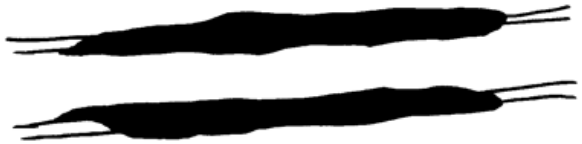
RadioGraphics 2002; 22:173–187

Cholangiocarcinoma

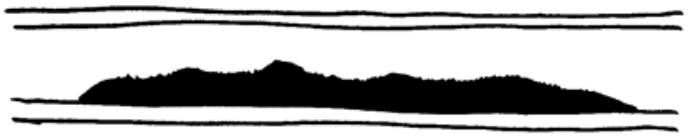
- There are several different classifications according to the patterns of growth
- The Liver Cancer Study Group of Japan has proposed a new classification based on growth characteristics, with tumors being identified as mass-forming, periductal-infiltrating, and intraductal-growing types
  - the exophytic or nodular type matches the mass-forming type,
  - the infiltrating or sclerosing type matches the periductal-infiltrating,
  - the polypoid or papillary type matches the intraductal-growing type
- The prognosis for mass-forming and periductal-infiltrating cholangiocarcinomas is generally unfavorable, whereas the prognosis for intraductal-growing cholangiocarcinoma is much better (or excellent) after surgical resection
- Most common type of peripheral cholangiocarcinoma = exophytic
- Infiltrative cholangiocarinoma is the most common type of hilar and extrahepatic cholangiocarcinoma
- Polypoid cholangiocarcinoma is infrequently found in both the intra- and extrahepatic ducts



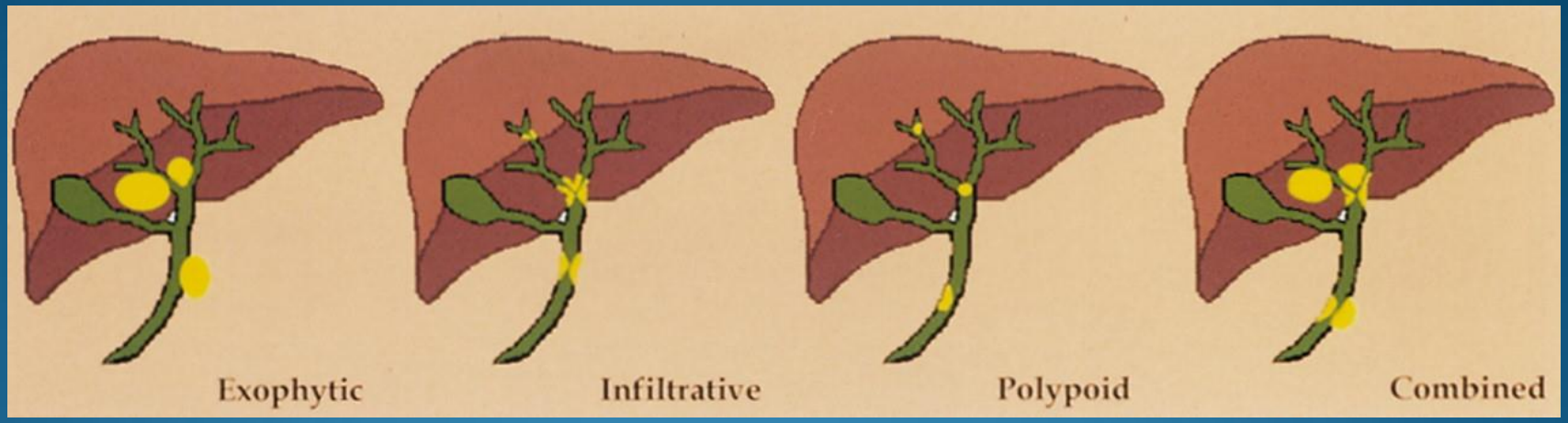
mass-forming
Exophytic
nodular



periductal-infiltrating
Infiltrating
sclerosing

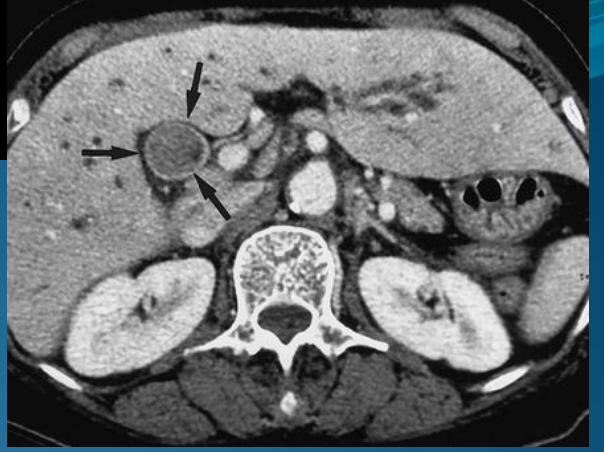


intraductal-growing
Polypoid
Papillary type


Exophytic
Infiltrative
Polypoid
Combined



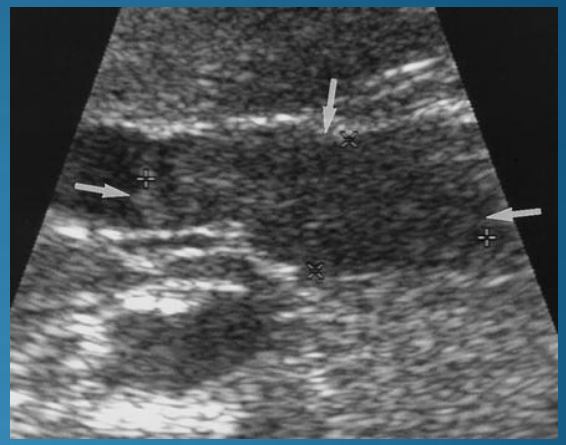






Infiltrative hilar cholangiocarcinoma

Arterial-phase CT scan shows a well-enhancing, thickened bile duct wall (arrows) at the hepatic hilar level.



Exophytic peripheral cholangiocarcinoma
Typical CT Findings:
Large hypoattenuating mass with lobular margins
Thin, rimlike contrast enhancement around the tumor at the arterial phase and concentric filling of contrast material at the equilibrium phase

Polypoid extrahepatic cholangiocarcinoma
polypoid mass (arrows) within the dilated proximal portion of the common bile duct

- **Child with imperforate anus and recurrent UTI's – why?**
  - Rectovesicular fistula

- **Child with imperforate anus and recurrent UTI's – why?**
  - Rectovesicular fistula

Rectovesicular fistula

- Subtle malformations, such as those in some children with perineal fistula that may look normal to the casual glance, may present months or years after birth when the child presents to a primary care provider for constipation or urinary tract infection and appears to have a small perineal body upon physical examination.
  - *Emedicine Imperforate Anus*

- **Regarding colon prep, what is the mechanism of action of Dulcolax**
  - A. Stimulates colonic Contraction
  - B. Stimulate secretion from gallbladder
  - C. Stimulate secretion from pancreas
  - D. Increase water reabsorption from small bowel
  - E. Decrease water reabsorption from small bowel

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A. Stimulates colonic Contraction

- Dulcolax = Bisacodyl is a stimulant laxative. It causes muscles in the colon to contract and stools to pass.
  - *Drugs.com*

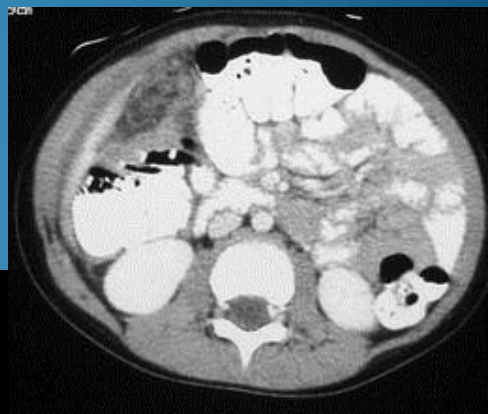
- **Omental infarction**:
  - A. Present with RUQ pain
  - B. Present with nausea and vomiting
  - C. Surgical intervention is not needed
  - D. Occurs mostly in thin people
  - E. Commonly secondary to adhesions

- **Omental infarction**:
  - A. Present with RUQ pain
  - B. Present with nausea and vomiting
  - C. Surgical intervention is not needed
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- **Omental infarction**:
  - A. Present with RUQ pain
  - B. Present with nausea and vomiting
  - C. **Surgical intervention is not needed**
  - D. Occurs mostly in thin people
  - E. Commonly secondary to adhesions

Omental Infarction

- Typical presentation is acute lower quadrant pain mimicking appendicitis
- The typical patient is an overweight or obese young adult with acute, usually right-sided, abdominal pain and tenderness. The laboratory evaluation is most often negative. Symptoms resolve within 24 - 72 hours. medpix



Omental Infarction

General Features

- Etiology
  - Half of cases are idiopathic, half are secondary to abdominal surgery
    - Right epiploic vessels involved in 90% of cases
  - Precipitating factors
    - Obesity
    - Vascular congestion
    - Kinking of vessels
    - Increase in intra-abdominal pressure
  - Kinking or pressure on omental veins may be caused by sudden positional change
  - Hemorrhagic infarction with fat necrosis
  - Followed by inflammatory infiltrate
  - Fibrosis & retraction → healing or autoamputation

Presentation

- Most common signs/symptoms
  - Mimics acute appendicitis or rarely acute cholecystitis
  - Acute abdominal pain
    - Right-sided in 90% of cases
  - Fever, with or without palpable mass in right lower quadrant
  - Rarely nausea, vomiting, diarrhea
    - Symptoms seen particularly in children
  - Benign, self-limited disorder
- Other signs/symptoms
  - Lab data
    - WBC and ESR normal or mildly elevated
  - Physical examination
    - Rebound tenderness in right lower quadrant with palpable mass

Demographics

- Age
  - Elderly obese people (85% of cases)
  - Less common in children (15% of cases)
    - Primary infarction occurs more often in young patients compared to secondary infarction
- Gender
  - M > F
  - Predisposing factors
    - Obesity
    - Digitalis
    - Blunt trauma
    - Abdominal surgery
    - Heart failure
    - Vigorous activity
    - Rarely superior mesenteric artery occlusion
- Epidemiology: Adults (85%), children (15%)

Natural History & Prognosis

- Complications
  - Abscess
  - Adhesions
  - Bowel obstruction
- Prognosis
  - Usually self limiting
  - Usually resolves spontaneously in one to four months
- Surgery can be avoided, especially when normal appendix is identified

Treatment

- Conservative management

- Which is true regarding autoimmune pancreatitis?
  - Pancreatic hypertrophy
  - Presents with pain and fever
  - Steroids don't help
  - There are strictures
  - Pancreatic function is restored following proper treatment
  - Presentation can be similar to acute pancreatitis

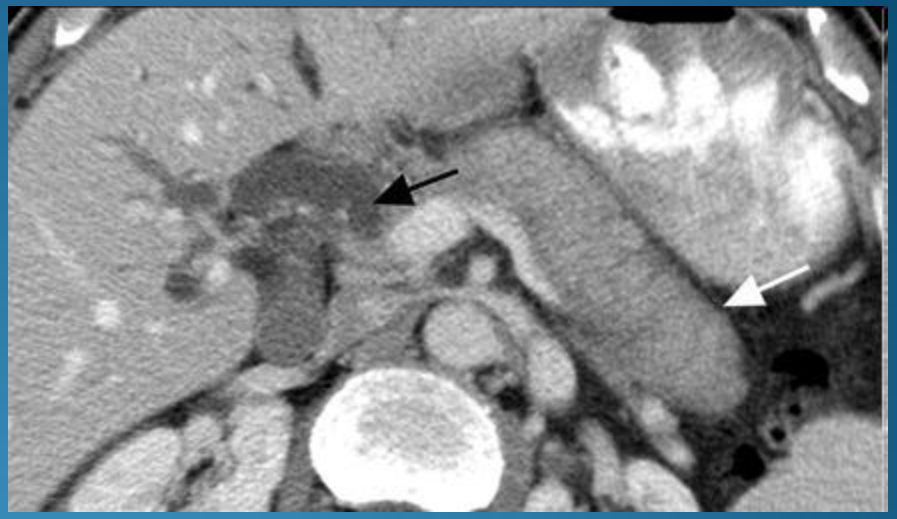
- Which is true regarding autoimmune pancreatitis?
  - Pancreatic hypertrophy (T)
  - Presents with pain and fever (F)
  - Steroids don't help (F)
  - There are strictures (T)
  - Pancreatic function is restored following proper treatment (T)
  - Presentation can be similar to acute pancreatitis (F)

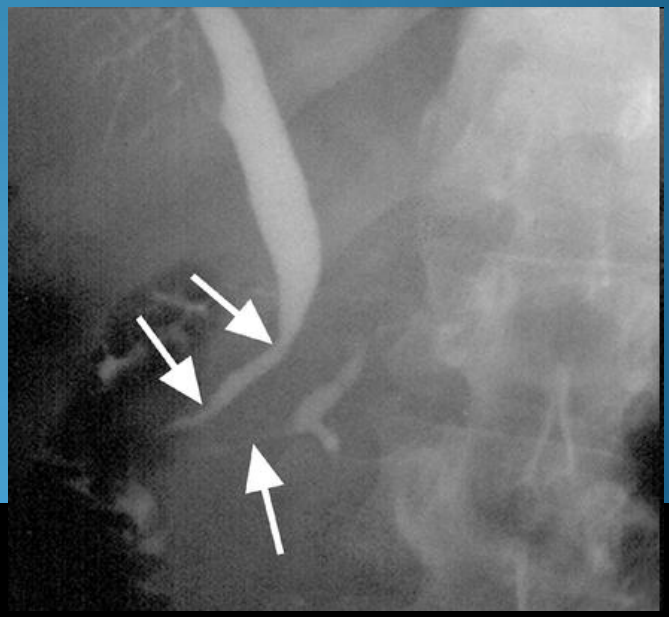
Autoimmune Pancreatitis

- AIP is characterized by the following features: (1) mild symptoms (abdominal pain, weight loss, nausea), usually without acute attacks of pancreatitis, (2) increased serum levels of gamma globulins, immunoglobulin G(IgG), or IgG4, (3) the presence of serum autoantibodies such as antinuclear antibody (ANA), anti-lactoferrin antibody, anti-carbonic anhydrase II antibody, and rheumatoid factor (RF), (4) a diffusely enlarged pancreas, (5) diffuse irregular narrowing of the main pancreatic duct and stenosis of the intrapancreatic bile duct on ERCP, (6) rare pancreatic calcification or cyst formation, and (7) marked responsiveness to treatment with corticosteroids. AIP is sometimes associated with other autoimmune disorders, most commonly Sjogren's syndrome, PSC, and IBD. AIP occurring in association with an autoimmune disorder has been referred to as "secondary" or "syndromic" AIP.
- CT findings in AIP include a diffusely enlarged hypoechoic pancreas or a focal mass that may be mistaken for a pancreatic malignancy. A low-density, capsule-like rim on CT (possibly corresponding to an inflammatory process involving peripancreatic tissues) is thought to be an additional characteristic feature. MRI reveals a diffusely decreased signal intensity and delayed enhancement on dynamic scanning. The characteristic ERCP finding is segmental or diffuse irregular narrowing of the main pancreatic duct, usually accompanied by an extrinsic-appearing stricture of the distal bile duct. Changes in the extrapancreatic bile duct similar to those of PSC have been reported.
  - wikipedia

Autoimmune pancreatitis

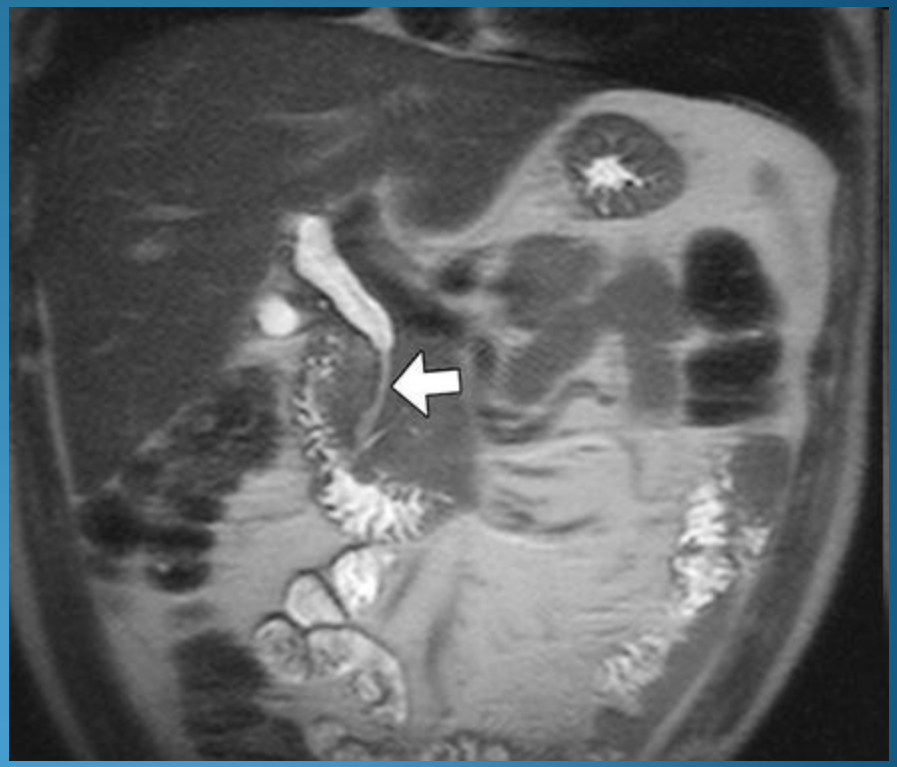
- Images obtained in 71-year-old man with diffuse form of autoimmune pancreatitis who had jaundice and abdominal pain at presentation. (**a**) Contrast-enhanced transverse CT scan shows diffuse enlargement of pancreas (white arrow), with sharp borders and minimal peripancreatic stranding. Associated dilated intra- and extrahepatic bile ducts (black arrow) are noted.
- Frontal endoscopic retrograde cholangiopancreatographic image obtained in 58-year-old man with autoimmune pancreatitis who had jaundice at presentation. Image shows stricture (double arrows) in distal common bile duct and proximal pancreatic duct (single arrow).
- Radiology





Autoimmune pancreatitis

- Coronal half-Fourier RARE T2-weighted MR image obtained in a different patient with abdominal pain demonstrates narrowing of the intrapancreatic common bile duct (arrow) by a diffusely enlarged pancreatic head without evidence of a specific mass.
- Radiographics



- **What is true regarding islet cell tumors?**
  - Most commonly located in head of pancreas
  - Glucagonoma is most common
  - Most often are non-functioning
  - Intra-operative u/s is very useful in locating them

- **What is true regarding islet cell tumors?**
  - Most commonly located in head of pancreas- can occur anywhere
  - Glucagonoma is most common- insulinoma is the most common
  - Most often are non-functioning- false
  - **Intra-operative u/s is very useful in locating them**

- Insulinoma is the most common and well-known islet cell tumor of the pancreas, accounting for more than 75-80% of sporadic functioning pancreatic islet cell tumors. Gastrinoma #2, nonfunctioning #3, glucagonoma is uncommon
- Intraoperative ultrasonography (IOUS): It is the study of choice for localization of insulinomas and is more effective than any other preoperative diagnostic imaging study, with a sensitivity of 90% (Gooding, 1993). Real-time IOUS images can provide additional information about the location and number of pancreatic endocrine tumors, and IOUS can be used to detect small lymph node and hepatic metastases (Norton, 1985; Grant, 1988). This technique should always be used in patients who undergo exploration for tumors that could not be definitively localized before surgery.
  - emedicine
- The majority of VIPomas have been located in the distal pancreas. Most glucagonomas have been located in the body and tail of the pancreas. Others can be more common in head.
  - Johns Hopkins patient care center

Islet Cell Tumors

- Pancreatic endocrine **tumors (islet cell tumors) can be classified into functioning or nonfunctioning types**
- Functioning **islet cell tumors include insulinoma, gastrinoma, glucagonoma, VIPoma, and somatostatinoma**
- Nonfunctioning endocrine **tumors, clinically silent but do secrete hormones in tiny amounts, rapidly degraded, biologically inactive**
- Non-functioning **tumors – the most common appearance is that of a hyperdense pancreatic mass**
- **Malignant insulinomas are large and produce extremely high levels of insulin or proinsulin**
- **Excessive gastrin production of gastrinoma leads to Zollinger-Ellison syndrome**
- Nonfunctioning endocrine **tumors may be clinically silent**
- **Extremely high insulin and proinsulin production in patients with insulinoma**
- **Excessive gastrin production win patients with gastrinoma**
- **Glucagonoma gives rise to syndrome: migratory necrolytic erythema, angular stomatitis, cheilitis, and atrophic glossitis**
- **VIPomas produce watery diarrhea, hypokalemia, hypochlorhydria, and metabolic acidosis, the Verner-Morrison syndrome**
- **Islet cell tumors account for only 1-2% of all pancreatic neoplasms**
- **Occur with equal frequency in men and women, peak age in 50s and 60s, located anywhere within gland**
- **Occur sporadically or be inherited as in patients with autosomal dominant multiple endocrine neoplasia (MEN I) syndrome**
- **Insulinoma, most common islet cell tumor, occurring with an incidence of approximately 1:100,000**
- **Gastinoma, second most common islet cell tumor**
- **Glucagonoma is a malignant tumor in over 60% of patients at the time of diagnosis; usually found in the tail of the pancreas**
- **Non functioning tumors, 60-83% of lesions are malignant at the time of diagnosis**

- 60 year old patient presents with recurrent abdominal pain. Plain film shows smooth lobulated mass and calcification in LUQ.
  - Gastric varices
  - Gastric Adenocarcinoma

- 60 year old patient presents with recurrent abdominal pain. Plain film shows smooth lobulated mass and calcification in LUQ.
  - **Gastric varices**
  - Gastric Adenocarcinoma

Gastric varices

- Gastric varices appear as multiple, smooth, serpiginous filling defects. Occasionally, a conglomerate of varices may **simulate a fundal mass**." *Primer 3rd p. 174*.
- "...splenic vein obstruction is most commonly caused by **chronic pancreatitis**, pancreatic pseudocysts, or pancreatic carcinoma... Large gastric varices may occasionally be recognized on chest or abdominal radiographs as one or more lobulated soft tissue densities in the gas-filled fundus. Depending on the cause of the varices (portal hypertension or splenic vein obstruction), abdominal plain films may also demonstrate splenomegaly, ascites, or **pancreatic calcifications**." *Gore & Levine p. 507*.
- The other choices do not adequately explain *both* the "lobulated" nature of the mass and pancreatic calcifications.

- **In neutropenic enterocolitis what is the least likely site of involvment?**
  - Cecum
  - Distal sigmoid
  - Ascending colon
  - Distal ileum
  - Transverse colon

- **In neutropenic enterocolitis what is the least likely site of involvment?**
  - Cecum
  - Distal sigmoid
  - Ascending colon
  - Distal ileum
  - **Transverse colon**

Neutropenic Enterocolitis

- Neutropenic enterocolitis (NE) is a life-threatening complication most commonly seen in patients receiving intensive chemotherapy for acute leukemia. The condition usually affects the terminal ileum, cecum, or ascending colon. In rare instances, NE may occur before the initiation of chemotherapy or involve more distal bowel.
  - ***Neutropenic enterocolitis as a presenting complication of acute lymphoblastic leukemia: an unusual case marked by delayed perforation of the descending colon***
- I found a lot of places talking about the sigmoid colon being involved in neutropenic colitis and its wall thickness being measured in one study along with TI and cecum. I didn't find that transverse was mentioned. *SFH*

- Which of the following would simulate cirrhosis?
  - Treated breast cancer
  - Focal fatty infiltration
  - Hemangioma

- Which of the following would simulate cirrhosis?
  - **Treated breast cancer- the appearance occurs after chemotherapy for stage iv breast ca and liver metastatic disease**
  - Focal fatty infiltration
  - Hemangioma

- **All of the following are seen in cirrhosis except:**
  - Nodular liver
  - Atrophy of caudate
  - Enlargement of left hepatic lobe

- **All of the following are seen in cirrhosis except:**
  - Nodular liver
  - **Atrophy of caudate- the caudate lobe hypertrophies in cirrhosis**
  - Enlargement of left hepatic lobe

Cirrhosis

- Enlargement of the left lobe and caudate lobe, believed to be the result of lobar-relative regeneration rather than fibrosis, secondary to an accident of vascular supply, is recognized by any cross-sectional technique,
  - *emedicine*

- **Which of the following is an indication for TIPS?**
  - Bleeding esoph. varices refractory to endoscopic treatment
  - Isolated gastric varices

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  - Bleeding esoph. varices refractory to endoscopic treatment
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TIPS

- In 1994, the United States National Digestive Diseases Advisory Board established a set of clinical indications for TIPS placement (Shiffman, 1995). These accepted indications are as follows:
- Acute variceal bleeding that cannot be successfully controlled with medical treatment, including sclerotherapy
- Recurrent and refractory variceal bleeding or recurrent variceal bleeding in patients who cannot tolerate conventional medical treatment, including sclerotherapy and pharmacologic therapy
  - emedicine

BOX 10-6 Indications and Contraindications for the Transjugular Intrahepatic Portosystemic Shunt Procedure

Accepted Indications

Acute variceal bleeding unresponsive to medical therapy (including sclerotherapy/banding)
Prevention of recurrent gastroesophageal variceal bleeding unresponsive to medical therapy (including repeated sclerotherapy/banding)
Refractory ascites
Refractory hepatic hydrothorax
Prevention of rebleeding with gastric and ectopic varices (colonic, stomal, anorectal)
Prevention of recurrent bleeding with portal hypertensive gastropathy on beta-blocker medication

Debated Indications

Budd-Chiari syndrome
Bridge to liver transplantation
Prevention of variceal bleeding after a single episode

Generally Not Acceptable

Primary prevention of variceal bleeding
Bleeding from gastric antral vascular ectasia
Hepatorenal syndrome
Hepatopulmonary syndrome

Absolute Contraindications

Polycystic liver disease
Severe hepatic failure
Severe right-sided heart failure (right atrial pressure >20 mm Hg)
Severe pulmonary hypertension (mean >45 mm Hg)
Uncontrolled systemic infection or sepsis
Unrelieved biliary obstruction

Relative Contraindications

Severe or uncontrollable hepatic encephalopathy
Hypervascular liver tumor
Portal vein thrombosis
Severe active infection
Complete hepatic vein obstruction
Uncorrectable severe coagulopathy
Moderate pulmonary hypertension

- **What is the initial treatment of hepatic hydrothorax?**
  - A. Sodium restriction and diuretics
  - B. LeVeen shunt
  - C. TIPS
  - D. Pleurodesis

- **What is the initial treatment of hepatic hydrothorax?**
  - A. **Sodium restriction and diuretics**
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  - D. Pleurodesis

Hepatic Hydrothorax

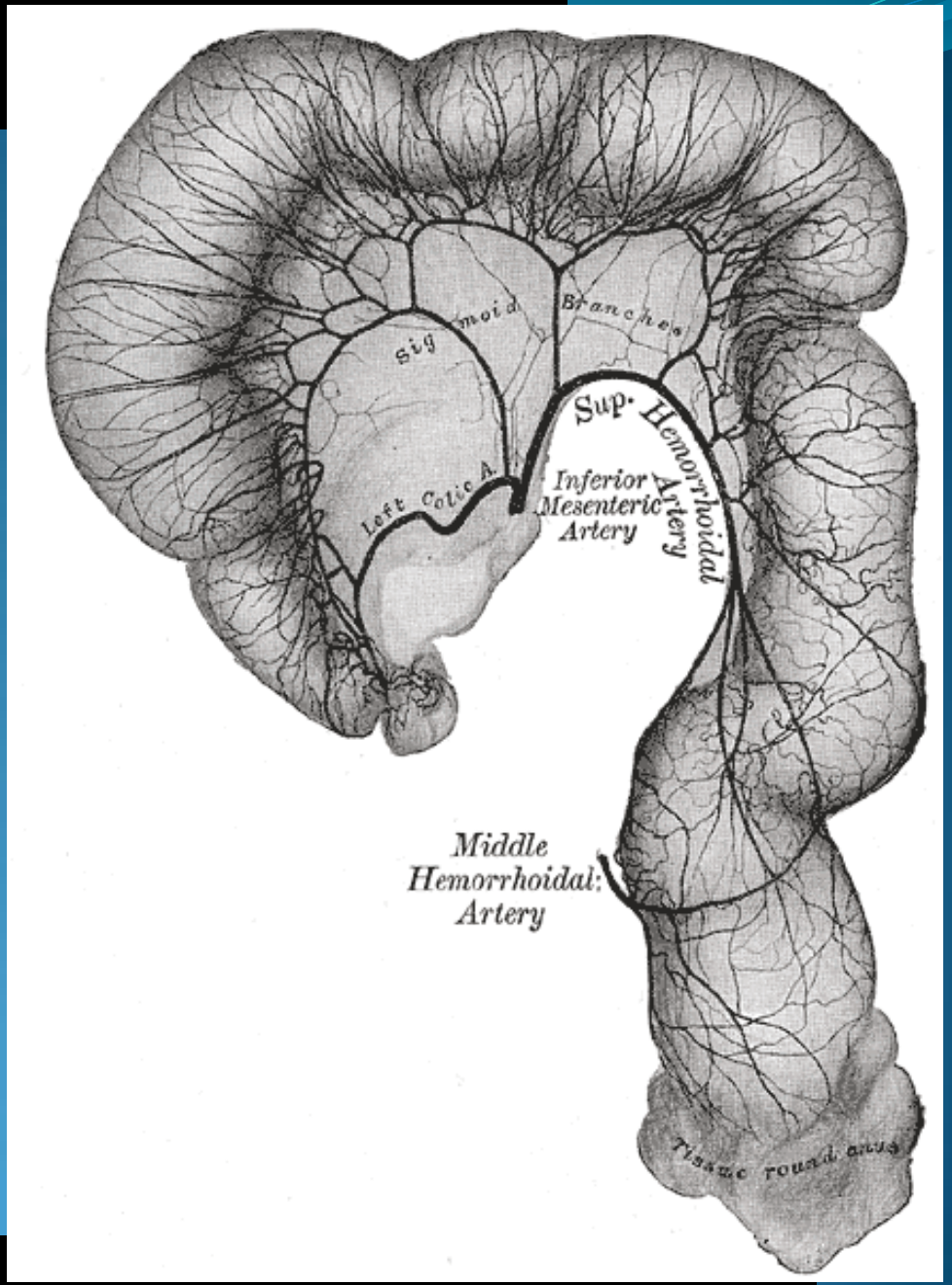
- It results from the passage of ascites from the peritoneal to the pleural cavity from small diaphragmatic defects.
- Initial management is sodium restriction and diuretics
  - *UpToDate*

- **Origin of superior hemorrhoidal artery**
  - IMA
  - Internal pudendal a.
  - External pudendal a.
  - Internal iliac a.

The **superior rectal artery** (**superior hemorrhoidal artery**).

•The superior rectal artery is the continuation of the inferior mesenteric artery
the middle rectal artery (from the internal iliac artery) and with the inferior rectal artery (from the internal pudendal artery).

Wikipedia



- **Pt with h/o pancreatic CA, s/p Whipple procedure 2 years prior now with jaundice, bil dil and bx-proven recurrence, next therapeutic step?**
  - Lap revision
  - XRT
  - Percutaneous bil drainage
  - ERCP placement of stent

- **Pt with h/o pancreatic CA, s/p Whipple procedure 2 years prior now with jaundice, bil dil and bx-proven recurrence, next therapeutic step?**
  - Lap revision
  - XRT
  - **Percutaneous bil drainage**
  - ERCP placement of stent

Percutaneous bil drainage

- Recurrence of malignant disease after surgery for gastric, pancreatic or biliary tumours sometimes leads to obstruction of the bile outflow in the duodenal or intestinal part. Due to the Roux-en-Y reconstruction or the reconstruction with an omega loop, endoscopic treatment is often impossible (related to difficult postsurgical anatomy).
- Decompression of the intestinal part proximal to the stenosis must be performed. One method often used is to leave a transhepatic percutaneous drain open with the obvious disadvantage of bile diversion to a plastic bag on the body surface and removal of the bile from the enteric system
  - Transhepatic Placement of an Enteral Stent to Treat Jaundice in a Tumor Recurrence Obstructed Afferent Loop after a Whipple Procedure

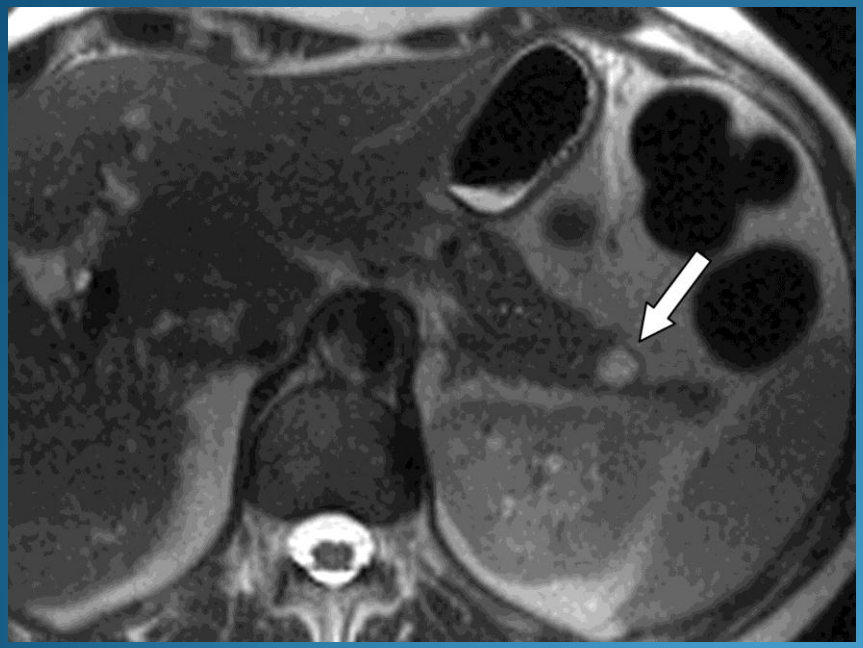
- **What are normal MRI imaging characteristics of islet cell tumors**
  - Hyper T2, Hyper post contrast T1
  - Hypo t1, hypo T2
  - Hyper T2, hyper T1

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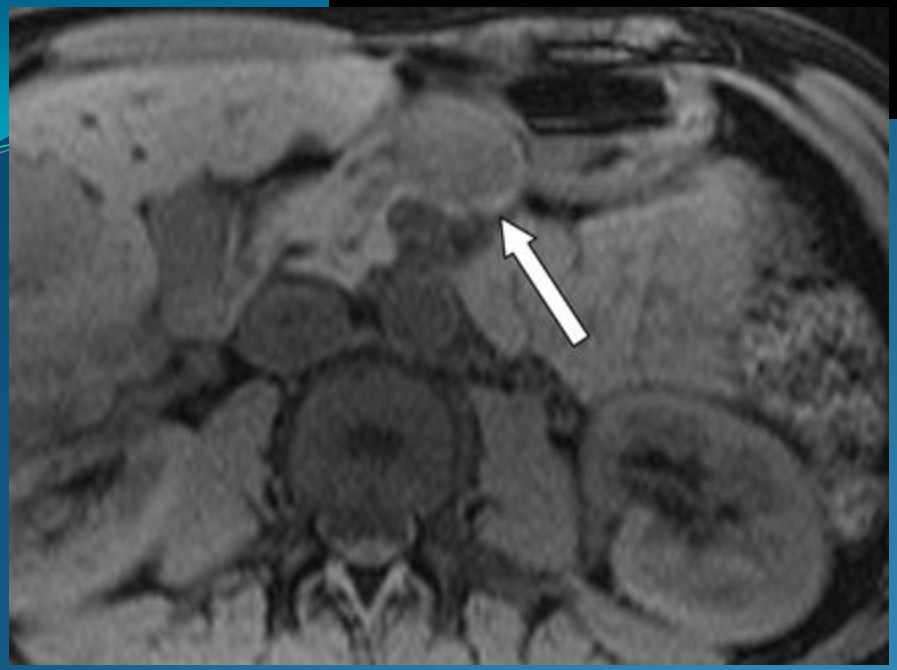
Islet Cell Tumors

- Islet cell tumors are usually bright on T2-weighted sequences
- The unenhanced T1-weighted fat-suppressed sequence provides excellent contrast between the low-signal-intensity tumor and the normal pancreas, which is bright
- Hypervascular enhancement is one of the typical imaging features of islet cell tumors and often helps distinguish them from the much more common pancreatic adenocarcinomas, which tend to be hypovascular and desmoplastic.
  - ***MRI of Islet Cell Tumors of the Pancreas; AJR***

Islet Cell Tumor



- 62-year-old woman with cystic lesion of pancreatic tail seen at MDCT, which proved to be islet cell tumor at fine-needle aspiration biopsy.
- Axial T2-weighted HASTE MR image shows 1-cm lesion (*arrow*) in pancreatic tail with high signal intensity mimicking pseudocyst or cystic neoplasm of pancreas.





Islet cell Tumor

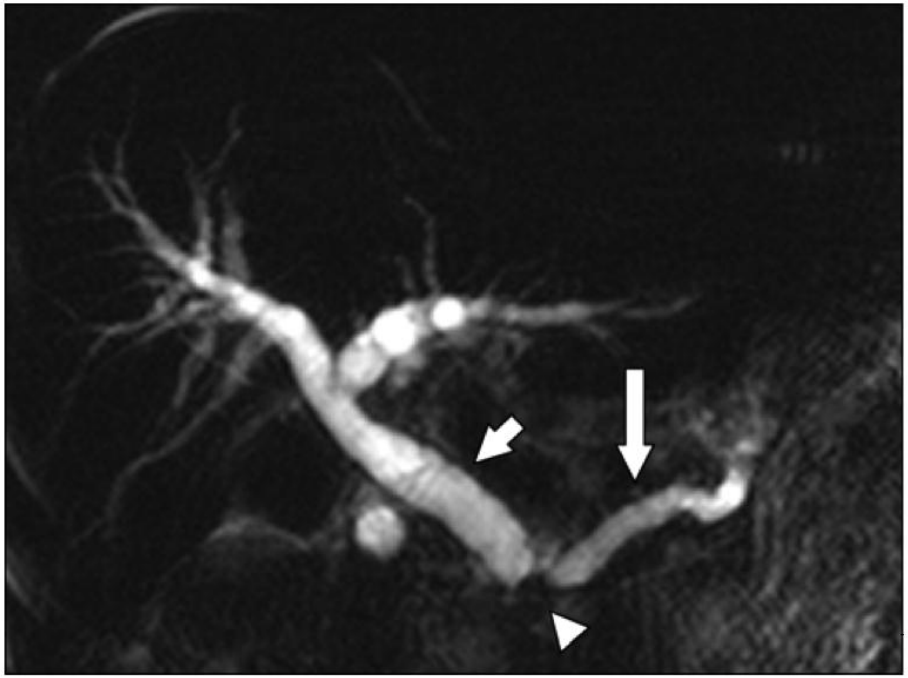
- 35-year-old woman with liver and pancreatic lesions incidentally discovered at sonography. Histologic examination revealed hepatic focal nodular hyperplasia and benign pancreatic islet cell tumor.
- Axial T1-weighted fat-suppressed spoiled gradient-echo MR image shows low-signal-intensity lesion (*arrow*) in pancreatic body, which is well seen relative to normal hyperintense pancreas due to excellent soft-tissue contrast resolution of MRI. Lesion appearance is nonspecific and can be seen with adenocarcinoma as well.
- T1 post contrast= enhancement

- **A mass in the duodenopancreatic region which is hypoattenuating on both pre and post contrast CT imaging**
  - adenoCA
  - Islet cell tumor
  - Microcystic adenoma

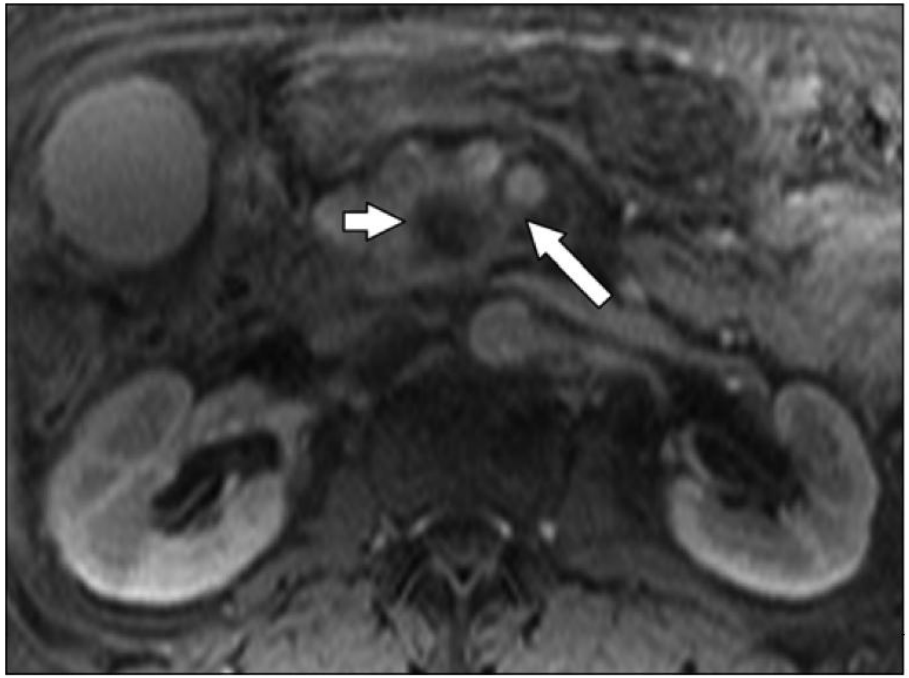
- **A mass in the duodenopancreatic region which is hypoattenuating on both pre and post contrast CT imaging**
  - **adenoCA-**
    - **T1W= hypo,**
    - **T2W=variable,**
    - **T1+C= poor or no enhancement**
  - Islet cell tumor-
    - T1W= hypointense, iso or heterogeneous,
    - T2w=iso to hyperintense,
    - T1+C= post contrast high signal, ring enhancing
  - Microcystic adenoma-
    - T1W= hypointense(central scar and calcification= hypointense),
    - T2W= hyperintense (central scar and calcification= hypointense),
    - T1+C= capsular enhancement, enhancement of septa delineating cysts, central scar- enhancement on delayed images

adenoCA

- The normal pancreas has an attenuation value of 30-50 HU. In pancreatic adenocarcinoma, a central zone of decreased attenuation occurs in 83% of patients. The margins of the low-attenuating mass usually are poorly defined and correspond to a **hypovascular** scirrhous tumor.
  - *emedicine*



A



B

Fig. 3—60-year-old man with mass in uncinate process of pancreas that proved to be pancreatic adenocarcinoma. Patient had elevated creatinine and could not receive iodinated contrast material on CT.

A, Coronal T2-weighted RARE MR cholangiopancreatography image shows dilation of common bile duct (*short arrow*) and pancreatic duct (*long arrow*) with abrupt termination at confluence of ducts (*arrowhead*). This double duct sign is highly suspicious for malignancy.

B, Axial late arterial-phase gadolinium-enhanced T1-weighted fat-suppressed gradient-recalled echo MR image shows 2.5-cm hypointense mass (*short arrow*) in head of pancreas responsible for double duct sign seen on MR cholangiopancreatography. Fat plane between superior mesenteric artery and pancreatic mass (*long arrow*) is obscured, suggesting vascular invasion.

Pancreatic Adenocarcinoma

MR Findings

- T1WI
  - Low signal intensity relative to normal parenchyma due to fibrous nature of tumor
  - Fat-suppressed T1WI
    - Hypointense lesion compared to high signal intensity of normal pancreatic parenchyma
- T2WI: Variable signal intensity
- T1 C+
  - Poor or no enhancement on dynamic study
  - No significant diagnostic improvement over CT
- T2 GRE & T1WI spin-echo sequences
  - Detects vascular invasion
- MRCP: Show level & degree of ductal obstruction

Pancreatic Islet Cell Tumors

MR Findings

- Functional tumors
  - Fat-saturated T1WI: Hypointense
  - T2WI SE & STIR sequences: Hyperintense (both primary & secondaries)
  - T1 C+
    - T1WI: Solid or ring-enhancement (insulinoma)
    - Fat-saturated delayed enhanced T1WI SE: Hyperintense (solid enhancing lesions)
- Nonfunctioning tumors
  - T1WI SE image
    - Small tumors: Isointense
    - Large tumors: Heterogeneous (cystic & necrotic)
  - T2WI SE image
    - Small tumors: Isointense
    - Large tumors: Hyperintense (cystic & necrotic)
  - T1 C+
    - Fat-saturated delayed enhanced T1WI SE: Hyperintense (small)
    - Nonenhancing (cystic + necrotic areas) & increased enhancing viable tumor

[redacted]

Serous Cystadenoma of Pancreas, Aka: Microcystic Adenoma of the Pancreas

MR Findings

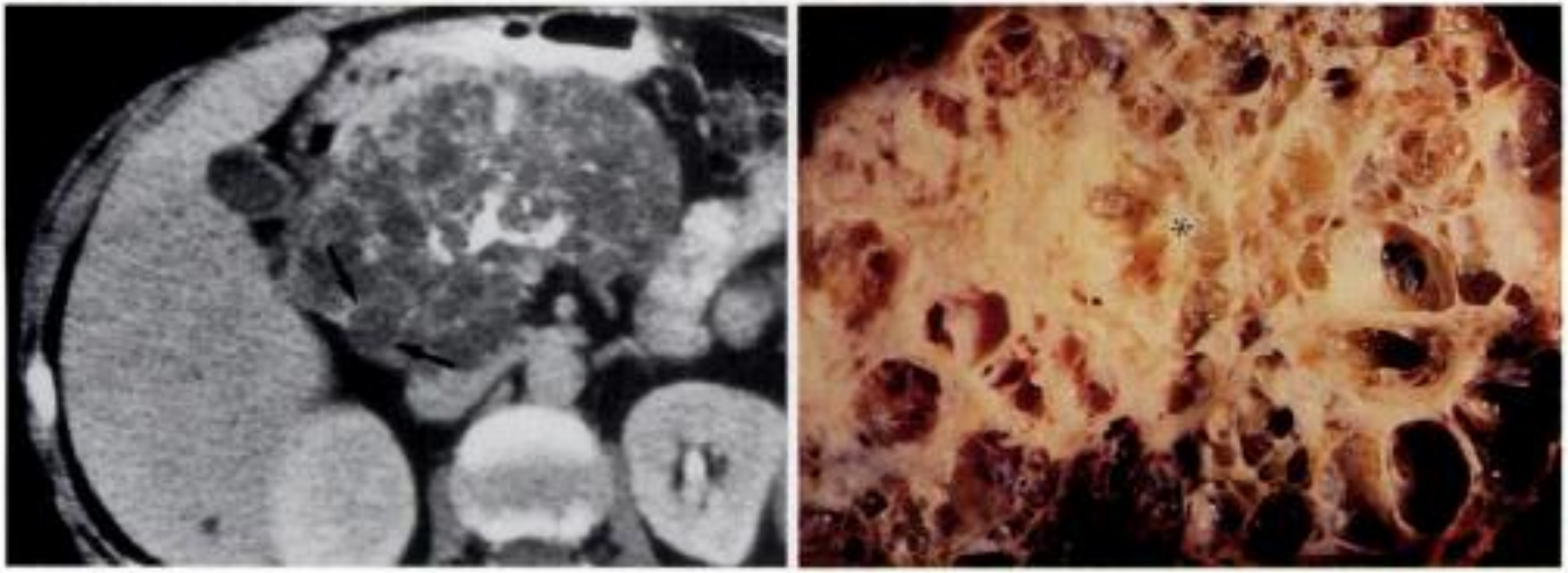
- T1WI
  - Tumor: Hypointense
  - Blood within cysts: Varied intensity
  - Central scar & calcification: Hypointense
- T2WI
  - Tumor: Hyperintense
  - Central scar & calcification: Hypointense
- T1 C+
  - Capsular enhancement
  - Enhancement of septa delineating small cysts
  - Central scar: Enhancement on delayed scan

[redacted]

Microcystic Adenoma

Radiographics

rounding tissues. On CT scans obtained without intravenously administered contrast material, the attenuation of the tumor is low and may be within the range of attenuation values for water (Fig 3a, 3b). After administration of contrast material, enhancement of all or a portion of the tumor is seen in most cases (Fig 4). The septa, particularly the



a. b.

Figure 2. Images of a 66-year-old woman with no symptoms in whom an abdominal mass was found during routine physical examination. **(a)** Computed tomographic (CT) scan demonstrates a large, well-defined mass in the pancreatic head. Much of the lesion has attenuation values similar to those of water (note the similar attenuation compared with that of the gallbladder); the honeycombed pattern (arrows) is due to fibrous septa of soft-tissue attenuation. A calcified central scar is seen. This appearance is classic for microcystic adenoma. The tiny low-attenuation lesion in the posterior right lobe of the liver is presumably a hepatic cyst. **(b)** Cut section of the gross specimen shows a multiloculated cystic mass with different-sized cysts and central areas of fibrosis and calcification (•).

- **Patient s/p liver transplant with biliary dilatation – further imaging should look for which of the following?**
  - Hepatic artery thrombosis
  - rejection

- **Patient s/p liver transplant with biliary dilatation – further imaging should look for which of the following?**
  - **Hepatic artery thrombosis**
  - rejection

Biliary Complications after Transplant

- Biliary complications occur in approximately 13-19% of adults following OLTX.
- With adult OLTXs, a primary, end-to-end choledochocholedochostomy is performed after donor cholecystectomy.
- In most cases of LDLTX, a biliary-enteric hepatojejunostomy is used to reconstitute bile drainage.
- Bile duct strictures can be anastomotic or nonanastomotic.
- Anastomotic Strictures
  - Some anastomotic strictures result from technical difficulties
  - Other anastomotic strictures are caused by fibrosis and scarring that can be associated with bile leaks.
  - can be related to marginal blood supply of the cut ends of the donor and recipient ducts; stricturing results from anastomotic ischemia.
- Nonanastomotic strictures can be caused by:
  - HAS (Hepatic Artery Stenosis)
  - HAT(Hepatic Artery Thrombosis),
  - prolonged cold ischemia time,
  - rejection,
  - cytomegalovirus infection,
  - intraductal sludge and stone formation, and
  - recurrent primary sclerosing cholangitis in the allograft

Biliary Complications After Transplant

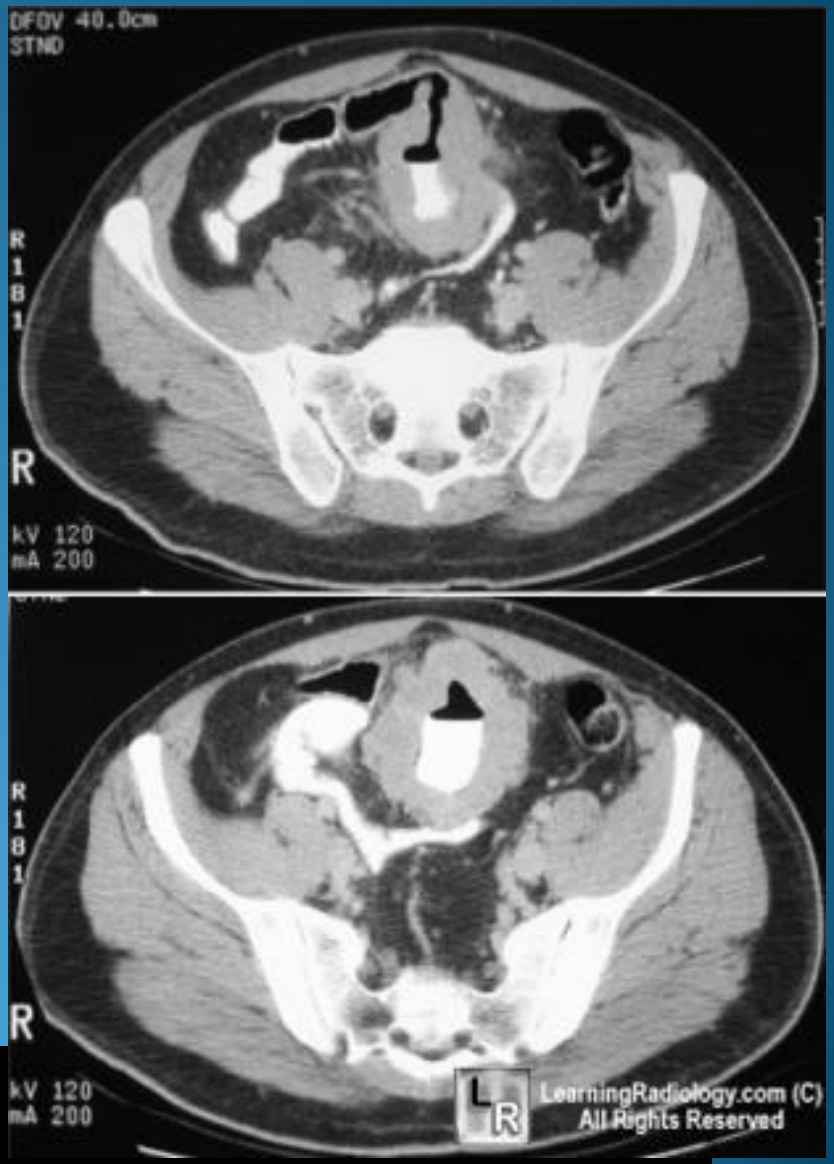
- Ischemic bile duct strictures can present with rapid onset of allograft dysfunction and sepsis.
- Unlike the native biliary tree, which is supplied by collaterals from the gastroduodenal artery, the harvested donor bile duct and the anastomotic end of the recipient duct are solely dependent on the hepatic artery.
- Compromise of the hepatic artery by HAS or HAT results in abrupt ischemia and necrosis of the biliary epithelium. This causes strictures, disruption of the ducts, bile leaks, bilomas, infected bilomas, and abscesses.
- Timely angiographic correction of HAS or HAT occasionally can result in graft salvage.
- Percutaneous drainage of associated fluid collections is often only a temporizing measure, because severe underlying biliary tree damage has usually occurred.
- Patients with sepsis who have severe biliary and hepatic damage from HAS or HAT require retransplantation for ultimate survival.

- **What most commonly causes aneurysmal dilatation of the small bowel?**
  - Non Hodgkins Lymphoma
  - Carcinoid
  - AdenoCa
  - GIST

- **What most commonly causes aneurysmal dilatation of the small bowel?**
  - **Non Hodgkins Lymphoma**
  - Carcinoid
  - AdenoCa
  - GIST

Non Hodgkins Lymphoma

- CT scan of the abdomen shows a loop of small bowel in the mid-abdomen with a markedly thickened wall;
  lower image shows a large, intraluminal collection of barium representing aneurysmal dilatation of the involved loop
  - *Learning radiology.com*

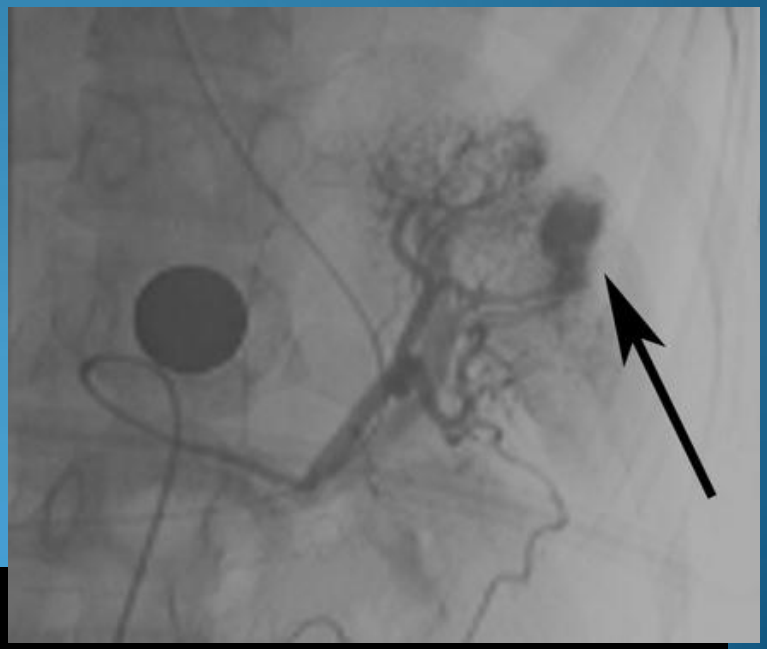


- **A patient in an MVA has a splenic laceration, what finding is most likely to prompt intervention?**
  - Perisplenic clotted blood
  - 3cm subcapsular hematoma
  - Splenic pseudoaneurysm
  - Peripheral pseudoaneurysm

- **A patient in an MVA has a splenic laceration, what finding is most likely to prompt intervention?**
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  - 3cm subcapsular hematoma
  - **Splenic pseudoaneurysm**
  - Peripheral pseudoaneurysm

Splenic pseudoaneurysm

- When a splenic pseudoaneurysm is diagnosed, we believe splenic artery embolization is indicated. *Trauma*







- **Figure 2a.** Splenic pseudoaneurysm in a 33-year-old patient who was admitted after a motor vehicle collision. **(a)** Transverse contrast-enhanced spiral CT scan shows a grade IV splenic laceration with multiple pseudoaneurysms (arrowheads in **a** and **b**). Free intraperitoneal blood (arrows) is seen around the spleen, liver, and right paracolic gutter. Pseudoaneurysms cannot be differentiated from active contrast material extravasation on this image. Free intraperitoneal blood (arrows) is seen around the spleen, liver, and right paracolic gutter.
- Selective splenic arteriogram shows multiple bleeding pseudoaneurysms (solid arrows) with intraparenchymal bleeds (open arrows). These vascular injuries were embolized successfully.

- **What is the most specific pattern of Barret's esophagus**
  - A. Hiatal hernia
  - B. Reflux esophagitis
  - C. Reticular mucosal pattern
  - D. Peptic stricture

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C. Reticular mucosal pattern

- AJR

Barrett's Esophagus: Diagnosis by Double-Contrast Esophagography

description of a high stricture or ulcer [19–21]. A reticular mucosal pattern has also been described as a highly specific sign of Barrett's esophagus on double-contrast esophagography [22], but this finding is only present in a minority of cases [18, 20–23] and its specificity has been questioned [18, 24]. Other, more common findings in Barrett's esophagus, such as gastroesophageal reflux, hiatal hernias, and reflux esophagitis, are nonspecific since they can be present in patients with uncomplicated reflux disease. Thus, radiographic findings that are relatively specific for Barrett's esophagus are not sensitive, and those that are sensitive are not specific. Many investigators therefore believe that esophagography has limited

The classic radiologic features of Barrett's esophagus consist of a high esophageal stricture or ulcer, often associated with a sliding hiatal hernia and gastroesophageal reflux [1,

- The stricture forms at the squamocolumnar junction. The Barrett stricture tends to be short and tight, typically causing eccentric narrowing of the lumen in contrast to the smooth, symmetric, and circumferential luminal narrowing in peptic strictures.
- A specific sign of BE is the ascending or migrating stricture, in which progressive upward migration of both the squamocolumnar junction and the level of the stricture is depicted on serial esophagograms.
- A delicate reticular pattern extending inferiorly for a variable distance from the level of a stricture has been described as a radiologic sign of Barrett metaplasia. However, this appearance is nonspecific, and it has been observed in other conditions such as candidiasis, viral esophagitis, superficial spreading carcinoma, and areae gastricae in a small hiatal hernia.
- Another radiologic sign that raises the possibility of BE is a focal defect in the esophageal contour at least 4 cm proximal to the esophagogastric junction. The contour defect is believed to be an early stage of a **midesophageal stricture, a classic feature of BE**. *emedicine*

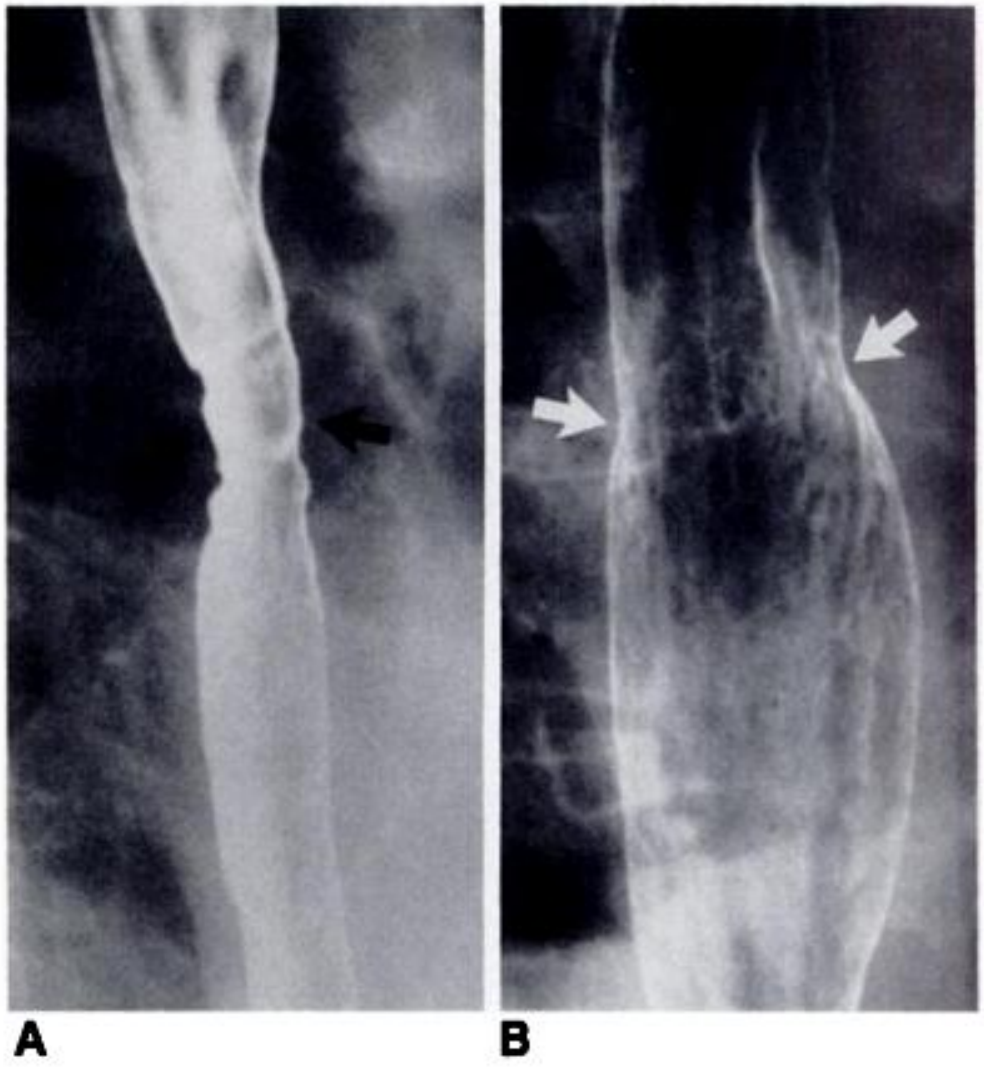


Fig. 1.—*A* and *B*, Double-contrast esophagrams show mid-esophageal strictures (*arrows*) in two patients classified as being at high risk for Barrett's esophagus. Also note reticular mucosal pattern adjacent to relatively early stricture (*arrows*) in patient in *B*. Both patients had endoscopically proved Barrett's esophagus.



- Spot radiograph from double-contrast esophagography shows a smooth stricture in the mid esophagus. Multiple ulcerations in the region of the stricture are seen. Note the reticular mucosal appearance extending down from the inferior aspect of the stricture.

- **Appearance of H. pylori gastritis in UGI**
  - Thickened gastric folds
  - Ulceration
  - Psuedosacculations
  - Erosions

- **Appearance of H. pylori gastritis in UGI**
  - **Thickened gastric folds**
  - Ulceration
  - Psuedosacculations
  - Erosions

H. Pylori Gastritis

- AJR

The radiologic manifestations of the gastritis associated with *H. pylori* infection have been best described by Sohn et al. [2]. The radiologic signs (Table 1) most commonly include thickening (>5 mm) of folds and nodularity. Erosions are similarly a sign of gastric infection but are less frequently seen. Additional signs include antral narrowing, inflammatory polyps, and prominent areae gastricae. Although radiologic–endoscopic correlation was not a part of the investigation by Sohn et al., the radiologic changes they described generally agree with endoscopic observations.

TABLE 1 Radiologic Findings in the Stomach in 88 Patients with *Helicobacter pylori* Infection

Finding	No. (%)
Thick folds	39 (44)
Thick, polypoid folds	24 (27)
Erosions	12 (14)
Ulcers	12 (14)
Narrowing	8 (9)
Polyps	5 (6)
Enlarged areae gastricae	14 (16)

Note.—Data taken from [2].

H

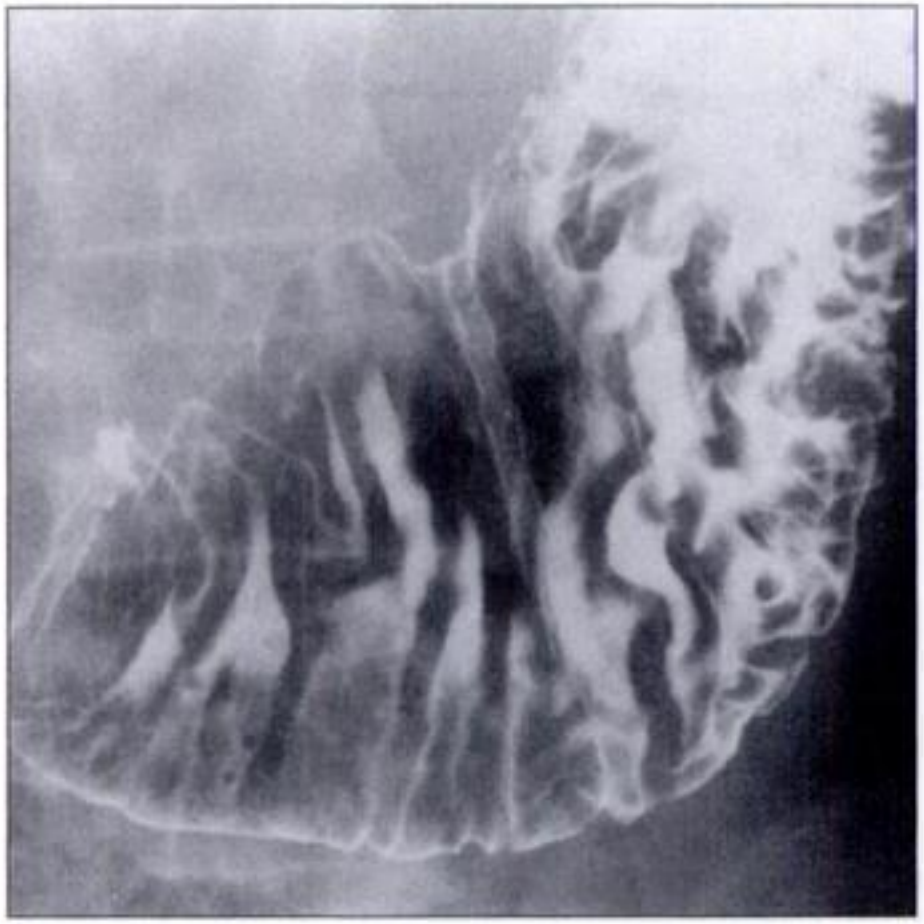


Fig. 5.—Radiograph obtained in patient with *Helicobacter pylori* gastritis showing thickened folds in gastric antrum and body. (Courtesy of Levine MS, Philadelphia, PA)

- **Most likely cause of pneumoperitoneum in adult without surgery:**
  - A. Duodenal ulcer
  - B. Diverticulitis
  - C. Appendicitis

- **Most likely cause of pneumoperitoneum in adult without surgery:**
  - A. Duodenal ulcer
  - B. Diverticulitis
  - C. Appendicitis

A. Duodenal ulcer

- The term pneumoperitoneum refers to air within the peritoneal cavity. The most common cause is a perforated abdominal viscus, generally a perforated ulcer,
- perforated appendix seldom causes a pneumoperitoneum
  - *Emedicine*

- **MRCP is useful in evaluating all of the following except?**
  - Stones
  - Primary Biliary Cirrhosis
  - Sclerosing cholangitis
  - Peripheral ducts to an obstructing mass

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PBC

- Magnetic resonance imaging (MRI) findings of primary biliary cirrhosis (PBC; currently regarded as a vanishing bile duct syndrome) are not established. In this report, we describe our preliminary analysis of the relation between MRI findings and histopathologic staging of PBC and review clinical, morphologic, and MRI findings of PBC especially focusing on the staging of PBC.
  - *MRI findings of primary biliary cirrhosis: correlation with Scheuer histologic staging. Abdominal Imaging*

PBC

- Imaging typically plays a minor role in the dx of PBC
- Dx based on clinical features and laboratory evaluation
- Cross sectional imaging has traditionally been used to stage liver disease by demonstrating portal HTN and cirrhosis. Imaging is also useful to detect the development of hepatic malignancies.
- In Most pts with PBC, cholangiograms are normal especially during the early stages of the disease. With disease progression, the intrahepatic bile ducts can become tortuous and attenuated in response to the surrounding cirrhosis.
- In areas of parenchymal atrophy, the ducts become crowded and tortous; in areas of compensatory hypertrophy or nodlar regeneration, the ducts become splayed or displaced.
- There can be extrinsic compression of the common bile duct due to lymphadenopathy within the porta hepatitis
- Cholangiography can be helpful in differentiating PSC from PBC.

Textbook of Gastrointestinal Radiology, Gore and Levine pg 1495-1497 3rd edition

- **Magnetic resonance cholangiopancreatography** (**MRCP**) is a medical imaging technique which uses magnetic resonance imaging to visualise the biliary and pancreatic ducts in a non-invasive manner. This procedure can be used to determine if gallstones are lodged in any of the ducts surrounding the gallbladder. Wikipedia
- Researchers have shown that MRCP is useful in the evaluation of sclerosing cholangitis,35,36 cystic neoplasm of the pancreas,37,38 biliary cystic disease (such as choledochal cysts and choledochoceles),4,39 and pancreatic trauma.4 In addition, the technique has been used successfully in children.39,40
- Duct caliber, anomalies, strictures, dilatation, filling defects (calculi), and extraductal collections of fluid (cysts, diverticula, and fistulas) can all be directly visualized by MRCP.
  - ***Magnetic Resonance Cholangiopancreatography; NEJM***

[redacted]

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- **Which is true about an Intraductal Papillary Mucinous Neoplasm?**
  - A. The side branch type has a higher incidence of malignancy
  - B. Patients present with signs and symptoms similar to recurrent or chronic pancreatitis
  - C. Cross sectional imaging is needed for diagnosis
  - D. Main duct and side branch varieties are associated with a bulging papilla

2006

- **Which is true about an Intraductal Papillary Mucinous Neoplasm?**
  - A. The side branch type has a higher incidence of malignancy- false is has a lower incidence
  - B. **Patients present with signs and symptoms similar to recurrent or chronic pancreatitis**-si/sx= pain, weight loss, diarrhea, attacks of pancreatitis & diabetes me(statdx)
  - C. Cross sectional imaging is needed for diagnosis
  - D. **Main duct and side branch varieties are associated with a bulging papilla**

D. Main duct and side branch varieties are associated with a bulging papilla

- On the other hand, there was a higher rate of carcinoma, invasive and non-invasive, in patients with IPMN involving the main duct, 61% as compared to 21% in patients with branch-duct type IPMN. Pancreas web
- These tumors are characterized by the endoscopic triad of a bulging ampulla of Vater, mucin secretion, and a dilated pancreatic duct. Despite advances in imaging techniques, such as the advent of computed tomography (CT) scanning and magnetic resonance imaging (MRI), there is still limited ability to preoperatively differentiate between these lesions and determine whether malignant disease is present. *Surgical Rounds*



- Figure 2. CT scan showing cystic dilatation of the main pancreatic duct.

IPMN

- **MRCP:** cystic dilatation of the main pancreatic
- **Figure 2.** CT scan showing cystic dilatation of the main pancreatic duct.



IPMT (Intraductal Papillary Mucinous Tumor)

- Neoplasms that involves either the main pancreatic duct or the branch ducts
- Diffuse or segmental dilatation of the main and/or branch pancreatic ducts
- Intraductal growth of the mucin-producing epithelial lining cells
- **Protrusion and dilatation of the major and minor papilla with mucus excretion**
- Diffuse or segmental dilatation of the main and/or branch pancreatic ducts
- Intraductal growth of the mucin-producing epithelial lining cells
- **Main duct involved have significantly higher likelihood of harboring more malignant epithelium than do those restricted to branch ducts**
- Branch duct IPMNs can arise anywhere within pancreas, although head, neck, and uncinate process most common locations
- Factors include: advanced age, main duct involvement, concurrent diabetes or other pancreas related abdominal symptoms, lesion size (greater than 3 cm), multiplicity
- More than 50% of cases, pancreatic duct bulges into ampulla of Vater with marked mucus hypersecretion seen in duodenum
- As opposed to serous cystadenoma and mucinous cystic tumor, **IPMN occurs with a slight increased frequency in male patients**
- **MRI-** Communication of cystic lesion with pancreatic duct, Magnetic resonance cholangiopancreatography (MRCP)Best visualized by the use of 3D techniques including MRCP
- The upper limits of normal of pancreatic ductal size on ERCP are 6.5 mm in the head, 6 mm in the body, and 3 mm in the tail of the pancreas.

imagingconsult

CLINICAL ISSUES

Presentation

- Most common signs/symptoms
  - BPD & MPD types
    - Pain, weight loss, diarrhea, attacks of pancreatitis & diabetes
  - Most specific predictive signs of malignancy
    - Diabetes mellitus
    - Solid mass on imaging
    - Dilated MPD: More than 10 mm
    - Diffuse/multifocal involvement
    - Attenuating/calcified intraluminal content

- Laboratory data
  - Increased serum & urinary amylase
  - Altered pancreatic function tests

Demographics

- Age: Onset between 60 & 80 years
- Gender: M > F
- Epidemiology: Rare pancreatic cystic neoplasm

Natural History & Prognosis

- Complications
  - Recurrent attacks of acute & chronic pancreatitis
  - Biliary disease
- Prognosis
  - Localized lesion
    - After resection have better prognosis than ductal adenocarcinoma & mucinous cystadenocarcinoma
  - Invasive carcinoma: Poor prognosis

Treatment

- In older & less symptomatic cases
  - Periodic monitoring of head/uncinate BPD variant
- In younger & more symptomatic cases
  - Complete surgical excision & frozen section analysis

- **What is the least likely location for the intraperitoneal seeding of colon cancer metastases?**
  - A. Superior to the sigmoid colon
  - B. Lateral to the ascending colon
  - C. Superior to the transverse colon
  - D. Anterior to the rectosigmoid colon
  - E. Medial to the cecum

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  - E. Medial to the cecum

? Superior to the transverse colon (other recalls give lateral to the cecum as a choice)

- Tumor cells in ascitic fluid tend to implant in four locations:
  1) **superior border of the sigmoid colon**, where the sigmoid mesocolon temporarily traps fluid in the left inframesocolic compartment
  2) **anterior wall of the rectosigmoid**, where the rectovaginal or rectovesical pouches constitute the most dependent portions of the peritoneal cavity
  3) **right paracolic gutter**, via which most excess fluid in the pelvis flows superiorly
  4) **ileocecal region**, which is the most dependent portion of the right inframesocolic compartment. *ACR GI CD-Rom. and Brant and helms p. 673*
- Cancers of ovary, pancreas, stomach and colon most commonly seed the intraperitoneal space. The retrouterine and retrovesicular space is the most common areas effected. Other areas include right lower quadrant small bowel loop (terminal ileum), the **MEDIAL border of the cecum**, the **sigmoid colon, the right paracolic gutter, and the transverse colon.** Peritoneal mets involving the greater omentum invade the transverse colon. *Ref. Chapter 12 Double contrast GI radiology, Levine and Laufer*
- ***Dahnert 5th 850 "Metastases to colon"***

Intraperitoneal Seeding

- determined by mesenteric reflexions, peritoneal recesses, and the forces of gravity and negative intraabdominal pressure.
- Intraperitoneal metastases tend to ledge in four specific areas
  - 1. btw the rectosigmoid and urinary bladder (level of the lower second to upper fourth sacral segments)/ anterior aspect of the rectosigmoid
  - 2. RLQ- along distal small bowel mesentery, smooth or lobulated extrinsic mass which indents the medial and inferior borders of the cecum below the level of the ileocecal valve.
  - 3. Sigmoid mesocolon- localized to the superior border
  - 4. Right paracolic gutter- lateral and posterior aspects of the cecum and proximal ascending colon

Pg 645-647 Gastrointestinal Radiology A pattern Approach Eisenberg ME

- **A 35 year-old, recently pregnant female with RUQ pain, polycythemia vera, and hepatosplenomegaly has a liver biopsy that shows hepatic necrosis. Which is most likely?**
  - A. HELLP syndrome
  - B. Hepatic artery occlusion
  - C. Autoimmune liver disease
  - D. Budd-Chiari syndrome

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  - C. Autoimmune liver disease
  - D. **Budd-Chiari syndrome**

Budd-Chiari syndrome

- The classic triad of abdominal pain, ascites, and hepatomegaly
- Most patients have an underlying thrombotic diathesis. In approximately a third of patients, an underlying cause is not evident. Causes of Budd-Chiari syndrome are as follows:
- Hematological disorders
  - Polycythemia rubra vera
  - Pregnancy and postpartum
- Both the acute form and the chronic form of BCS result in severe centrilobular congestion and hepatocellular necrosis and atrophy. *emedicine*

- **Spontaneous bacterial peritonitis is a risk factor of:**
  - A. Cirrhosis
  - B. Perforated duodenal ulcer

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A. Cirrhosis

- Spontaneous bacterial peritonitis (SBP) is an acute bacterial infection of ascitic fluid. Generally, no source of the infecting agent is easily identifiable, but contamination of dialysate can cause the condition among those receiving peritoneal dialysis (PD). SBP occurs in both children and adults and is a well-known and ominous complication in patients with cirrhosis.
- SBP can occur as a complication of any disease state that produces the clinical syndrome of ascites, such as congestive heart failure and Budd-Chiari syndrome. *emedicine*

- **An MRI is performed for a rectocutaneous fistula in order to:**
  - A. Prevent examination by an anesthesiologist under sedation
  - B. Evaluate for occult disease
  - C. Determine extent of the disease

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  - C. Determine extent of the disease

B. Evaluate for occult disease

- However, a significant proportion of patients are difficult to treat either because the relationship between the **fistula** and anal sphincter is unclear or because they suffer recurrence as a consequence of **fistulas** and any secondary tracks ("extensions") left undetected and thus untreated at surgery [1]. For many years, examination under anesthesia (EUA) by an experienced colorectal surgeon was considered the reference standard for the detection of **fistulas** and any associated extensions, but it is now accepted that preoperative **MRI** has a sensitivity surpassing EUA
  - ***MRI of Fistula In Ano:*** *AJR*

Variant Recall

- **MRI for crohn fistula, why perform?**
  - Asses for fistula abscess
  - Avoid exam under anesthesia
  - Look for occult fistula not seen on anesthesia exam

Variant Recall

- **MRI for crohn fistula, why perform?**
  - **Asses for fistula abscess**
  - Avoid exam under anesthesia
  - Look for occult fistula not seen on anesthesia exam

Asses for fistula abscess

- Improvements in MR technology, such as fast scanning techniques, have permitted accurate diagnosis of complications of CD, including abscess, fistula, and stenosis. MRI is useful when ionizing radiation is contraindicated, and it has been used successfully in children and pregnant women. Along with endoscopic US, MRI is the preferred tool for evaluating perianal complications of CD.
- Huprich JE, Bree RL, Foley WD, Gay SB, Glick SN, Heiken JP, Levine MS, Ros PR, Rosen MP, Shuman WP, Greene FL, Rockey DC, Expert Panel on Gastrointestinal Imaging. Crohn's disease. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 11 p. [46 references]

- **An esophagram shows a 2 cm anterolateral outpouching near the cricopharyngeus muscle. What is the most likely diagnosis?**
  - A. Pharyngeal diverticulum
  - B. Pharyngeal pouch
  - C. Killian-Jamison diverticulum
  - D. Zenker's diverticulum
  - E. Pseudodiverticulum

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Killian-Jamison diverticulum

- These diverticula protrude through a muscular gap in the **anterolateral wall** of the cervical esophagus inferior to the cricopharyngeus and lateral to the longitudinal muscle of the esophagus just below its insertion on the posterior lamina of the cricoid cartilage [1]. This gap (also known as the Killian-Jamieson space) [2,3,4] should be differentiated from the muscular gap in the posterior portion of the cricopharyngeus (also known as Killian's dehiscence), the site of development of a Zenker's diverticulum
  - *Killian-Jamieson Diverticula ; AJR*

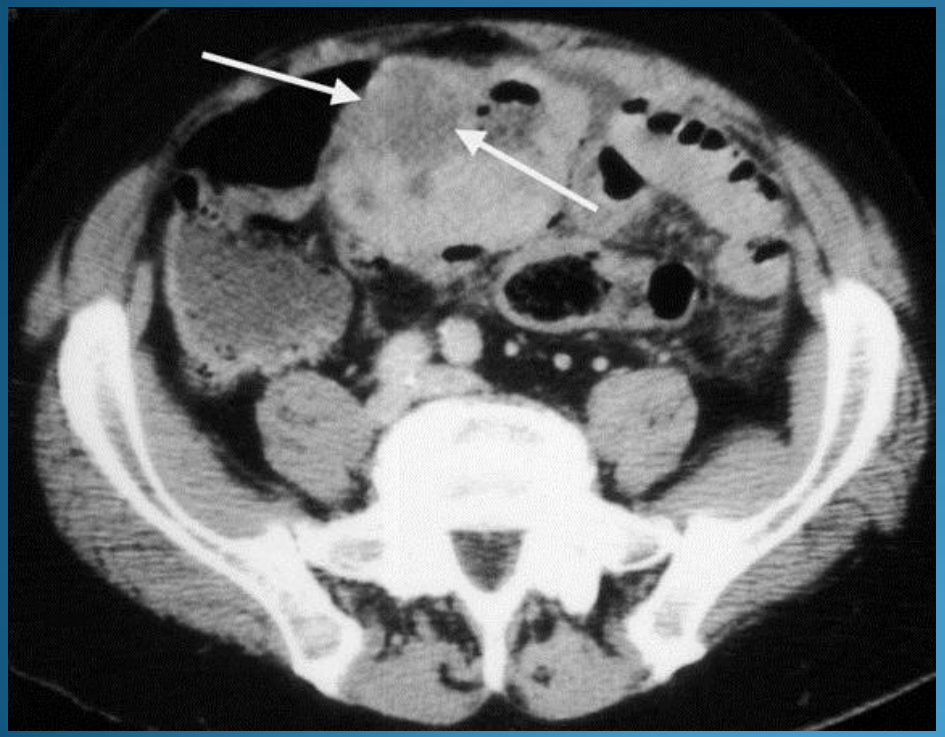
- **Which is characteristic of a GIST?**
  - A. A large central area of low density representing necrosis
  - B. An exophytic mucosal mass
  - C. Radiation is used for treatment

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GIST

- Grossly, GISTs are well-demarcated spherical masses that appear to arise from the muscularis propria layer of the GI wall. Intramural in origin, they often project exophytically and/or intraluminally, and they may have overlying mucosal ulceration. Larger GISTs nearly always outgrow their vascular supply, leading to extensive areas of necrosis and hemorrhage
- Occasionally, dense focal calcifications are present. Larger GISTs with necrosis appear as heterogeneous masses with enhancing borders of variable thickness and irregular central areas of fluid, air, or oral contrast attenuation that reflect necrosis
- GISTs appear as sharply delineated, heterogeneous masses with cystic and necrotic areas. The masses tend to be isointense relative to skeletal muscle on T1-weighted images and hyperintense on T2-weighted images. Signal intensity voids are present if gas is present within areas of necrotic tumor *EMEDICINE*

Gastrointestinal stromal tumor.



- **A more caudal portion of the tumor has areas of necrosis (arrows), with air present within the necrotic cavity that communicates with the lumen of the small bowel.**

- **Which is most characteristic of hepatocellular carcinoma?**
  - A. It is hyperintense in the arterial phase on T1W images with central clearing later
  - B. Well-circumscribed

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  - A. **It is hyperintense in the arterial phase on T1W images with central clearing later**
  - B. Well-circumscribed

HCC

- Gadolinium-enhanced MRI typically demonstrates that HCCs densely enhance, usually in the arterial phase, particularly if they are small. A lesion showing arterial enhancement is most likely HCC. emedicine
- Rapid central washout after the early enhancement of the lesion and coronal enhancement surrounding the lesion are highly specific and diagnostic findings of small hypervascular hepatocellular carcinomas if present at multiarterial phase contrast-enhanced dynamic MRI. AJR, Multiarterial Phase Dynamic MRI of Small Early Enhancing Hepatic Lesions in Cirrhosis or Chronic Hepatitis: Differentiating Between Hypervascular Hepatocellular Carcinomas and Pseudolesions

- **What is not true regarding familial adenomatous polyposis?**
  - A. Greater than 80% have adenomatous polyps in stomach
  - B. It is associated with abdominal wall desmoid tumors
  - C.100% incidence of colon CA if colon not resected
  - D. Increased incidence of tumor near the ampulla

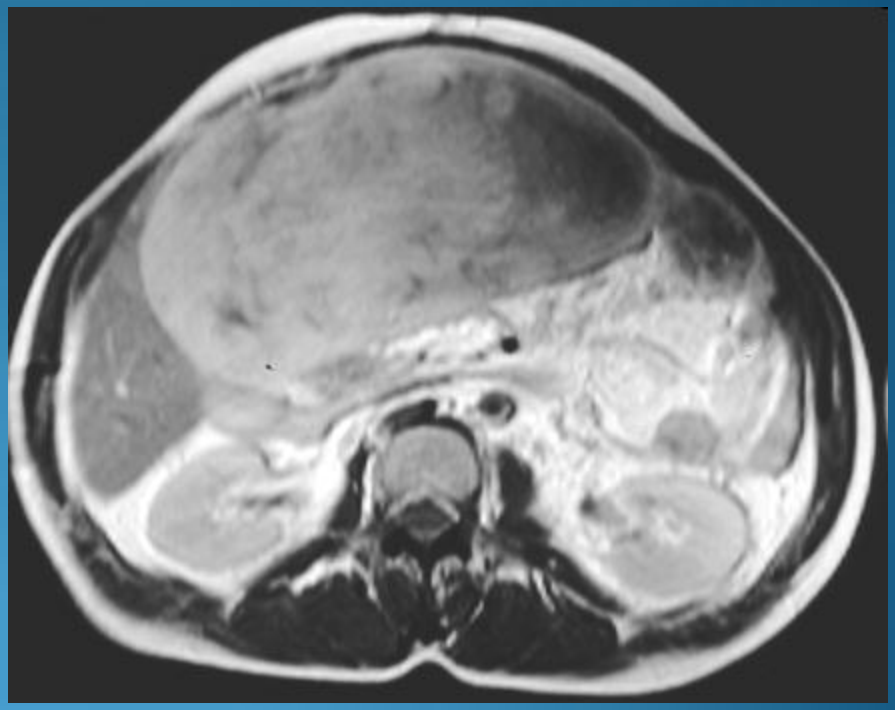
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  - D. Increased incidence of tumor near the ampulla

FAP

- The principal cause of mortality is colorectal cancer, which develops in all patients unless they are treated
- The second reported lethal complication of FAP is diffuse mesenteric fibromatosis and is referred to as a desmoid tumor
- The second most common malignancy in patients with FAP is adenocarcinoma of the duodenum and the papilla of Vater.
  - emedicine

Desmoid Tumor

- Bulky mesenteric desmoid tumor in 51-year-old man. Contrast-enhanced axial T1-weighted spin-echo MR image (470/13) shows significant heterogeneous enhancement of desmoid tumor
  - *Radiographics*



- **A patient has ulcers in the ileum on the mesenteric border with sacculations on the antimesenteric border. What is the most likely diagnosis?**
  - A. Crohn Disease
    B. Yersinia Infection
    C. TB infection
    D. Ischemia
  - E. Giardia infection
  - F. Adenocarcinoma

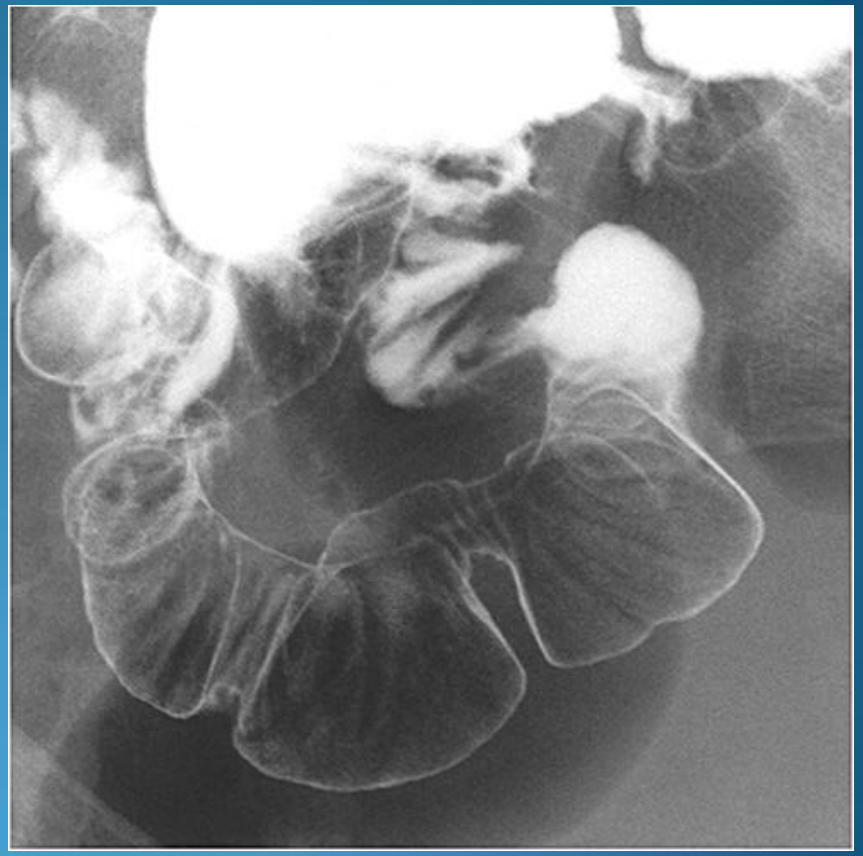
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    C. TB infection
    D. Ischemia
  - E. Giardia infection
  - F. Adenocarcinoma

Crohn Disease

- Again, there is shortening of the ileum on the mesenteric border with sacculation on the antimesenteric border. This radiological feature resembles a shell. The sign is caused by the predilection of Crohn's ulcers for the mesenteric border of the bowel. Ulceration can then be followed by fibrosis and shortening such that there are sacculations on the antimesenteric border. Although comparative studies are needed, the sign may be pathognomonic of Crohn's disease; Gastrointestinal: The shell sign of Crohn's disease; Journal of Gastroenterology and Hepatology

Crohn's Disease





- **On barium enema, a 1.5 cm polyp is seen in a 50 year old man. What is the likelihood of it being malignant?**
  - A. 10%
  - B. 20%
  - C. 35%
  - D. 60%
  - E. 90%

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  - **A. 10%**
  - B. 20%
  - C. 35%
  - D. 60%
  - E. 90%

A. 10%

- Adenomas comprise approximately 10% of polyps. Most (~90%) are small, usually less than 1.5 cm in diameter, and have a very small potential for malignancy. The remaining 10% of adenomas are larger than 1.5 cm and have about a 10% chance of containing invasive cancer. *emedicine*

- **What are the imaging characteristics of pancreatic adenocarcinoma?**
  - A. Isoattenuating to normal pancreatic tissue on pancreatic phase enhanced ct
  - B. Well defined mass
  - C. Atrophy of the pancreatic body/tail peripheral to mass
  - D. Tend to displace vessels
  - E. Tend to be hyperechoic compared to normal tissue on ultrasound

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- A change in size is usually focal, and focal enlargement is seen in about 96% of patients with pancreatic adenocarcinoma. The size is an unreliable indicator of tumor, as a normally sized pancreatic head is consistent with a carcinoma of pancreas when atrophy of the body and tail is observed. This feature may be seen in pancreatic carcinoma in as many as 20% of patients. *emedicine*

- **What structure attaches to the anterior border of the pancreas?**
  - A. Lesser omentum
  - B. Gastrocolic ligament
  - C. Mesentery of transverse colon
  - D. Greater omentum

- **What structure attaches to the anterior border of the pancreas?**
  - A. Lesser omentum
  - B. Gastrocolic ligament
  - C. **Mesentery of transverse colon**
  - D. Greater omentum

- **Which is associated with glycogen storage disease?**
  - A. Adenoma
  - B. FNH
  - C. Hemangioma
  - D. Hepatic cysts

- **Which is associated with glycogen storage disease?**
  - **A. Adenoma**
  - B. FNH
  - C. Hemangioma
  - D. Hepatic cysts

Adenoma

- Imaging may reveal hepatic adenoma, which may become malignant. Emedicine Glycogen Storage Disease
- Hepatic adenomatosis is a well-known complication of glycogen storage disease type Ia (von Gierke disease)

- **A large, necrotic, small bowel mass is found on fluoroscopy. Which is least likely?**
  - A. Adenocarcinoma
  - B. Lymphoma
  - C. Melanoma metastases
  - D. GIST

- **A large, necrotic, small bowel mass is found on fluoroscopy. Which is least likely?**
  - A. Adenocarcinoma
  - B. Lymphoma
  - C. **Melanoma metastases**
  - D. GIST

Melanoma

- Malignant melanoma produces smooth, round to polypoid metastases that can cause transient intussuception rather than complete obstruction. The mass often is a duodenal “target” lesion with central ulceration.
- CT Evaluations of Small Bowel Neoplasms: Spectrum of Disease; Radiographics

- **What is the most potent stimulus for pancreatic secretion?**
  - A. CCK
  - B. Gastrin
  - C. Secretin
  - D. Insulin
  - E. Glucagon
  - F. VIP

- **What is the most potent stimulus for pancreatic secretion?**
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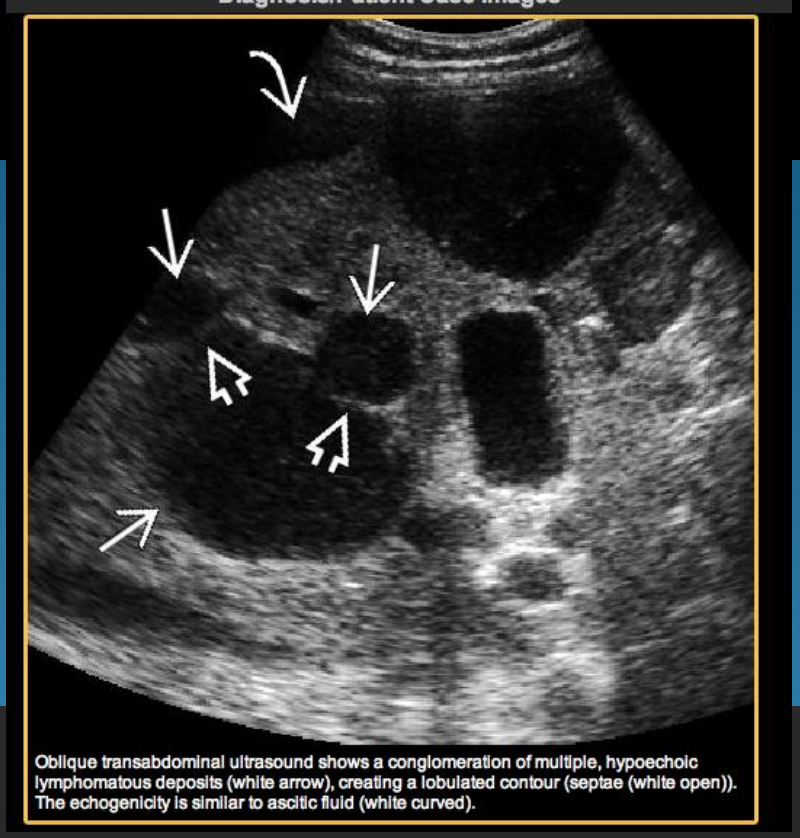
CCK

- **Cholecystokinin is the principle stimulus for delivery of pancreatic enzymes and bile into the small intestine.**
- www.vivo.colostate.edu
- Secretin is the principle stimulus for sodium bicarbonate

- **What is the most likely hypoechoic liver lesion?**
  - A. Hepatocellular carcinoma
  - B. Hemangioma
  - C. Adenoma
  - D. Colon cancer met
  - E. Lymphoma
  - F. Focal fat

- **What is the most likely hypoechoic liver lesion?**
  - A. Hepatocellular carcinoma- most common appearance small HCCs are hypoechoic, mixed echogenicity is most common appearance of larger HCCs
  - B. Hemangioma-over 2/3 are hyperechoic, may appear hypoechoic in a fatty liver
  - C. Adenoma- hypo,iso,or hyperechoic
  - D. Colon cancer met- GI tract malignancies are usually hyperechoic
  - **E. Lymphoma- hypoechoic or anechoic**
  - F. Focal fat- hyperechoic

Hepatic Lymphoma



Oblique transabdominal ultrasound shows a conglomeration of multiple, hypoechoic lymphomatous deposits (white arrow), creating a lobulated contour (septae (white open)). The echogenicity is similar to ascitic fluid (white curved).

Ultrasonographic Findings

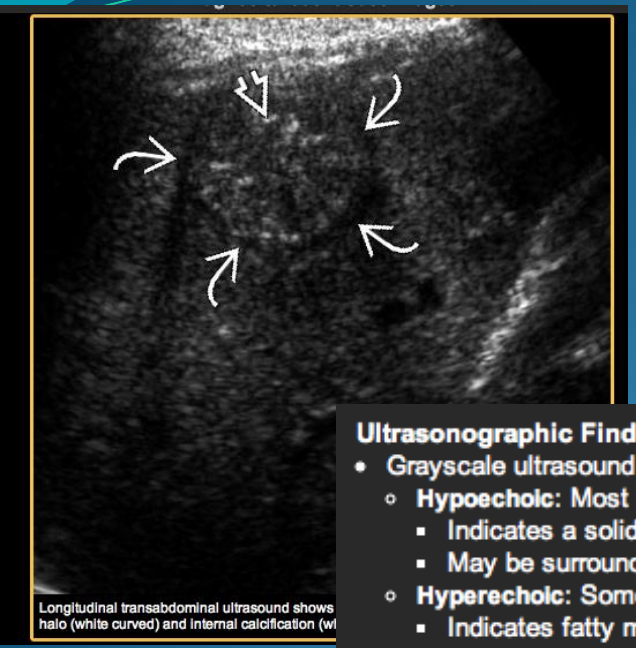
- Grayscale ultrasound
  - Hepatomegaly
  - **Discrete form**
    - Multiple, well-defined, nodules/masses
    - Hypoechoic/anechoic (low echogenicity probably due to high cellular density and lack of background stroma)
    - Large/conglomerate masses may appear to contain septae and mimic abscesses
  - **Diffuse/Infiltrative form**
    - Innumerable subcentimeter hypoechoic foci, miliary in pattern and periportal in location
    - Infiltrative pattern may be indistinguishable from normal liver
    - Most of these are missed and only diagnosed on autopsy
  - Other signs of lymphoma
    - Associated splenomegaly or splenic lesions
    - Lymphadenopathy (periportal, para-aortic, mesenteric)
    - Bowel wall thickening (infiltration)
    - Ascites

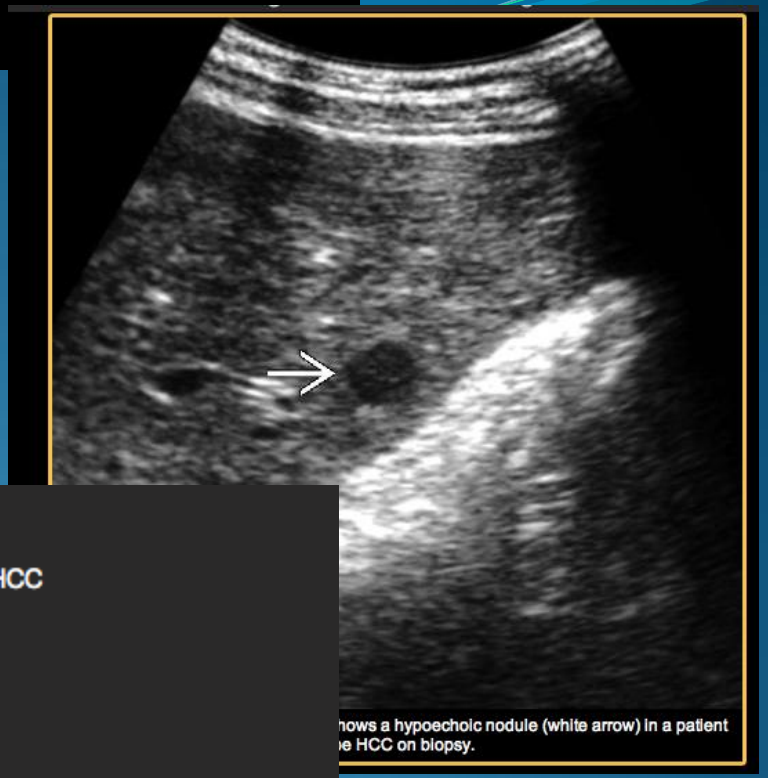
Ultrasound and Liver Metastases

Ultrasonographic Findings

- Grayscale ultrasound
  - Round or oval, with smooth or irregular borders
  - Causes architectural distortion if large or numerous
  - No portal vein invasion
  - **Hypoechoic metastases**
    - Suggest hypovascular & hypercellular tumors: Lung, breast, lymphoma
  - **Hyperechoic metastases**
    - GI tract malignancy
    - Vascular metastases from neuroendocrine tumors, choriocarcinoma, renal cell carcinoma, melanoma
  - **"Bull's eye" or "target" lesions**
    - Hypoechoic halo suggests malignancy: Metastasis or hepatocellular carcinoma
    - Alternating layers of hyper- & hypoechoic tissue
    - Solid mass with hypoechoic rim or halo
    - Metastases usually from aggressive primary tumors
    - Classic example: Bronchogenic carcinoma
  - **Cystic/necrotic metastases**
    - May demonstrate posterior enhancement
    - Mural nodules, thick walls, fluid-fluid levels, internal septae/debris distinguish them from simple cysts
    - Necrotic center may be lined with irregular walls and contain debris
    - Cystic primaries: Cystadenocarcinoma of pancreas/ovary; colon
    - Necrosis/treated metastases: Sarcomas; squamous cell carcinoma
  - **Calcified metastases**
    - Markedly echogenic interface with acoustic shadowing or diffuse small echogenic foci
    - Mucinous primaries: Colon, ovary
    - Calcific/ossific primaries: Osteosarcoma, chondrosarcoma, neuroblastoma, malignant teratoma
    - Treated metastases
  - **Infiltrative/diffuse metastases**
    - Lung or breast primary
    - May simulate cirrhosis

HCC and US


Longitudinal transabdominal ultrasound shows
halo (white curved) and internal calcification (wi


hows a hypoechoic nodule (white arrow) in a patient
e HCC on biopsy.

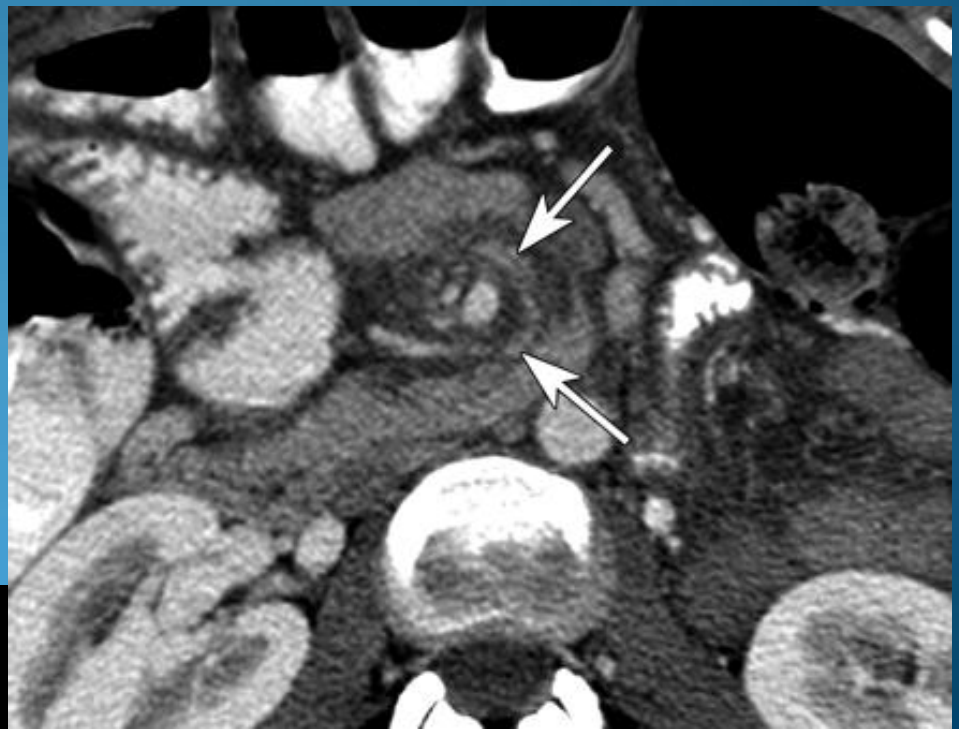
Ultrasonographic Findings

- Grayscale ultrasound
  - **Hypoechoic**: Most common appearance, especially for small HCC
    - Indicates a solid tumor
    - May be surrounded by a thin hypoechoic halo (capsule)
  - **Hyperechoic**: Sometimes in small HCC
    - Indicates fatty metamorphosis/hypervascularity
    - Simulates hemangioma/focal steatosis
  - **Mixed echogenicity**: More common in larger HCC
    - Indicates tumor necrosis/fibrosis
  - Background cirrhosis (except for fibrolamellar HCC)
  - Focal fat may be found within some large HCCs
  - Calcification is rare unless treated
  - Invasion of portal vein & less commonly hepatic vein may occur
  - Hilar lymphadenopathy (rare)
  - Hemoperitoneum if subcapsular HCC ruptures
  - Associated signs of portal hypertension: Ascites, splenomegaly, portosystemic collaterals
  - Fibrolamellar HCC
    - Well-defined partially/completely encapsulated mass
    - Prominent central fibrous scar
    - Calcification within scar
    - Intralesional necrosis/hemorrhage
    - Regional adenopathy and metastases to lung and peritoneum
    - Evidence of background cirrhosis or hepatitis in < 5% of patients
    - AFP usually negative or mildly elevated

- **What is the most common complication after laparoscopic gastric bypass when compared to open gastric bypass?**
  - A. Infection
  - B. Splenic injury
  - C. Internal hernia

Internal hernia

- Swirling of the mesentery was the best-performing single sign in our series, AJR

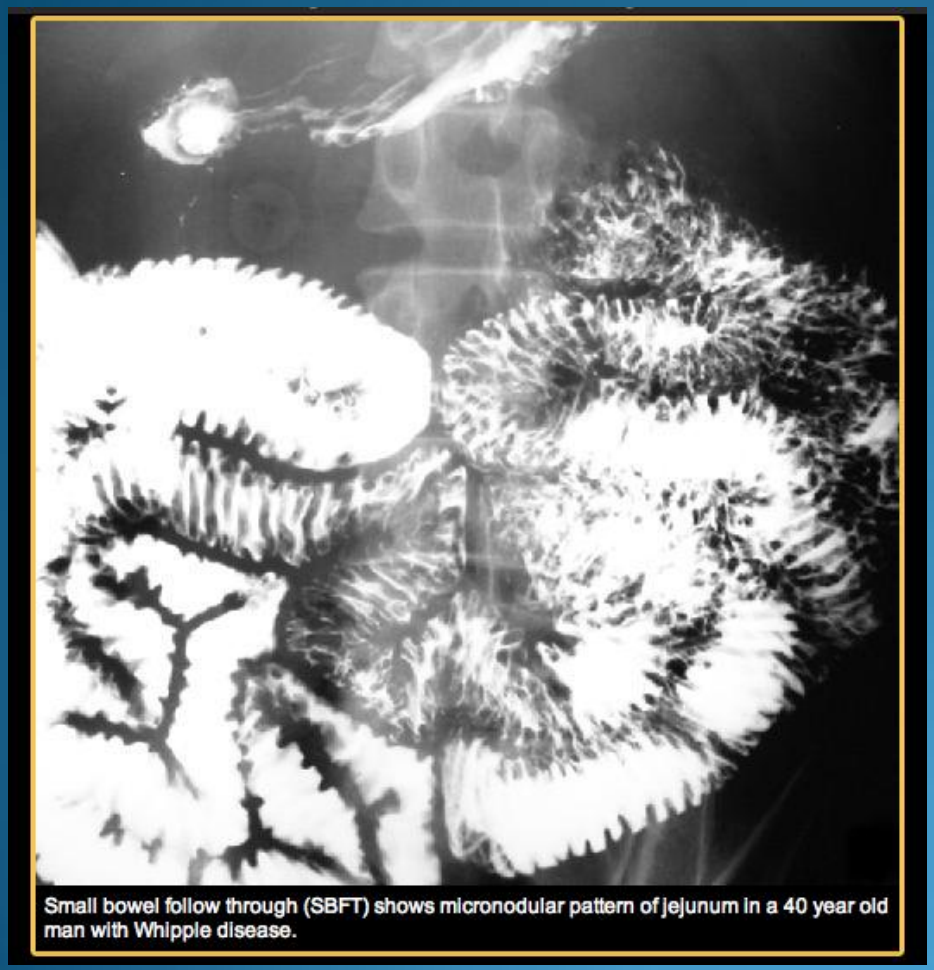


- Per “Radiology: Gastrointestinal Complications of Laparoscopic Roux-en-Y Gastric Bypass Surgery: Clinical and Imaging Findings1” Major complications.—Of 463 patients, 44 (9.5%) had 56 major GI complications. There were 21 (4.5%) patients with 23 bowel obstructions, 14 (3.0%) patients with 16 major leaks, 15 (3.2%) patients with 15 anastomotic strictures, and one patient each with gastrogastric and gastrocutaneous fistulas. And of the 23 SBO, there were 13 pts with 14 internal hernias.
- This article suggests that the most common complication was SBO and that internal hernias were quite uncommon. It is true that internal hernias are more common in lap then open procedures.
- According to Archives of Surgery paper 3464 cases of lap, stomal stenosis was the most common complication and then bowel obstruction.

- **Whipple disease is characterized by:**
  - A. Hyperdense spleen
  - B. Scattered calcifications in the liver
  - C. Low density para-aortic lymph nodes
  - D. low attenuation seen in the bowel

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  - A. Hyperdense spleen
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  - **C. Low density para-aortic lymph nodes**
  - D. low attenuation seen in the bowel

Whipple Disease



Small bowel follow through (SBFT) shows micronodular pattern of jejunum in a 40 year old man with Whipple disease.



Axial CECT shows very low density nodes in the retroperitoneum and mesentery.



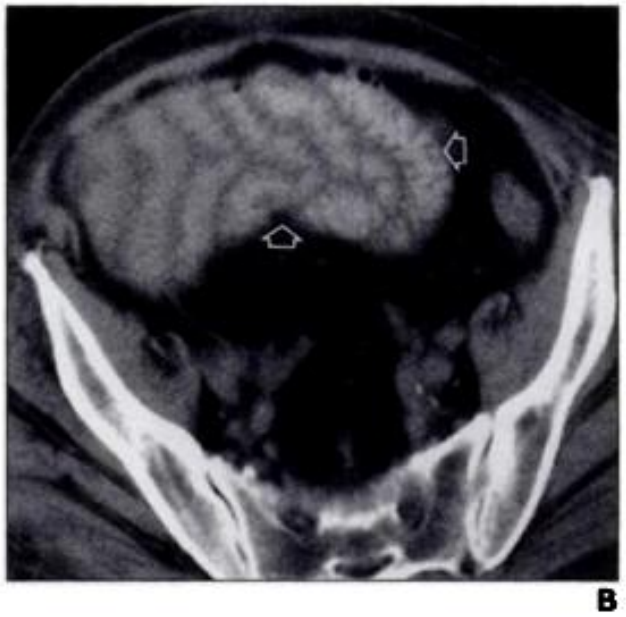


Fig. 2.—Whipple's disease in 52-year-old man with chronic diarrhea. **A** and **B**, Abdominal CT scans obtained with oral contrast agent show diffuse, minimal small-bowel wall thickening (*open arrows*). Small bowel is minimally dilated. In addition, many low-density lymph nodes are present in mesentery and paraaortic regions (*solid arrows*, **A**).

- AJR

Uncommon Inflammatory Diseases of the Small Bowel: CT Findings

Karen M. Horton[1] and Elliot K. Fishman[2]

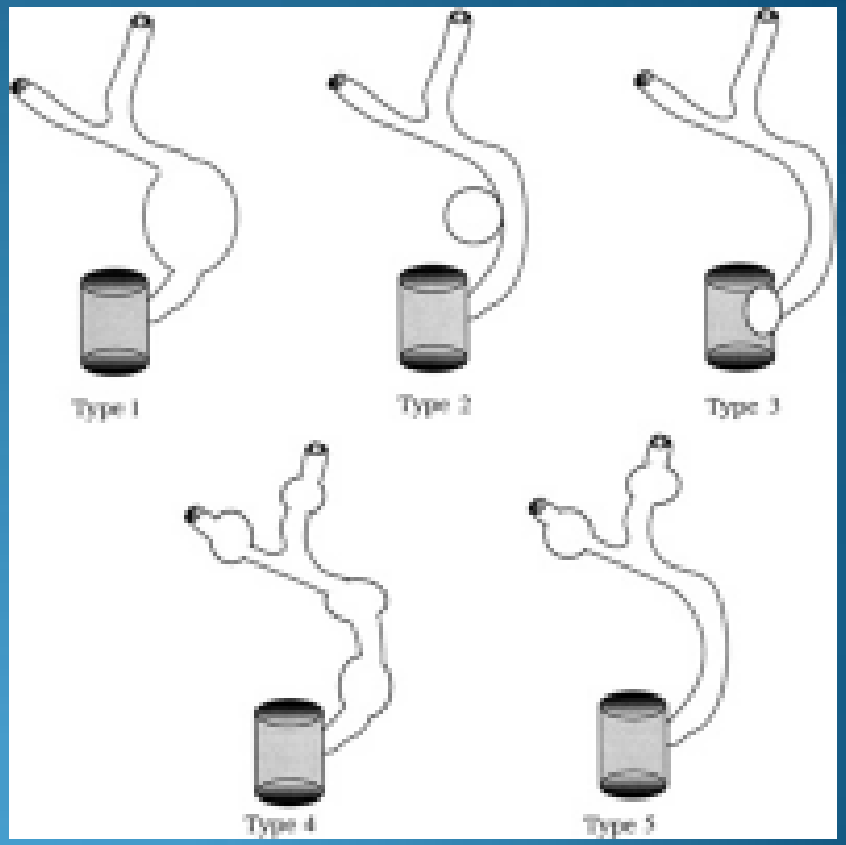
- **What is the most common type of choledochal cyst?**
  - B. Fusiform dilatation of the common bile duct
  - C. Caroli's disease
  - D. Intrahepatic cystic dilatation
  - E. Choledochocele

B. Fusiform dilatation of the common bile duct

- Type I choledochal cysts - These are the most common, representing 80-90% of the lesions. Type I cysts are dilatations of the entire common hepatic and common bile ducts or of segments of each. They can be saccular or fusiform in configuration. *emedicine*

Fusiform dilatation of the common duct

- ***FIGURE 27.29.*** **Classification of Congenital Biliary Cysts.** Type 1 choledochal cysts (80% to 90% of cases) are focal, saccular or fusiform, dilatations of the common bile duct. Type 2 cysts (2%) are true diverticula of the common bile duct. Type 3 cysts (1.4% to 5%) are termed choledochoceles and are dilatations of the terminal intraduodenal portion of the common bile duct. A type 4 classification (19%) refers to multiple intrahepatic and extrahepatic bile duct cysts. Caroli disease is classified as type 5.



- **What is the most specific finding of bowel ischemia?**
  - A. Mesenteric venous gas (also recalled as portal venous gas)
  - B. **Thrombus in the superior mesenteric artery**
  - C. Ascites
  - D. Bowel wall thickening
  - E. Pneumatosis

Table 1
Analysis of CT Findings

CT Finding	Study Group ($n = 39$)*	Control Group ($n = 24$)*	Sensitivity (%)†	Specificity (%)†	Accuracy (%)†
SMA thrombosis	7 (18)	0 (0)	18 (0.06, 0.30)	100	49 (0.37, 0.61)
SMV thrombosis	6 (15)	0 (0)	15 (0.04, 0.26)	100	48 (0.36, 0.60)
Intramural gas	11 (28)	1 (4)	28 (0.14, 0.42)	96 (0.88, 1.00)	54 (0.42, 0.66)
Portal venous gas	2 (5)	0 (0)	5 (0.00, 0.12)	100	41 (0.29, 0.53)
Bowel dilatation	26 (67)	17 (71)	67 (0.52, 0.82)	29 (0.11, 0.47)	52 (0.40, 0.64)
Bowel obstruction	4 (10)	16 (67)	10 (0.01, 0.19)	33 (0.14, 0.52)	19 (0.09, 0.29)
Bowel-wall thickening	15 (38)	8 (33)	38 (0.23, 0.53)	67 (0.48, 0.86)	49 (0.37, 0.61)
Extreme enhancement of thickened wall	13 (33)	7 (29)	33 (0.18, 0.48)	71 (0.53, 0.89)	48 (0.36, 0.60)
Lack of bowel-wall enhancement	7 (18)	1 (4)	18 (0.06, 0.30)	96 (0.88, 1.00)	48 (0.36, 0.60)
Mesenteric edema	27 (69)	15 (62)	69 (0.54, 0.84)	28 (0.10, 0.46)	57 (0.45, 0.69)
Ascites	19 (49)	7 (29)	49 (0.33, 0.65)	71 (0.53, 0.89)	57 (0.45, 0.69)
Ischemia of other organs	7 (18)	0 (0)	18 (0.06, 0.30)	100	49 (0.37, 0.61)
At least one specific sign	25 (64)	2 (8)	64 (0.49, 0.79)	92 (0.81, 1.00)	75 (0.64, 0.86)

* Numbers in parentheses are percentages.
† Numbers in parentheses are confidence intervals.

- The most common CT finding in **bowel ischemia** is **bowel** wall thickening, although it is nonspecific
- Intramural gas is a less common but more specific CT sign of ischemic **bowel** disease.
- Mesenteric or portal venous gas is an even less common CT manifestation of ischemic **bowel** disease and represents the propagation of intramural gas into the mesenteric venous system.
- Absent or poor enhancement of the **bowel** wall appears to be the most specific finding for **bowel ischemia**.
- *Radiographics; CT and MR Imaging Findings of **Bowel Ischemia** from Various Primary Causes1*

- **What is the most appropriate initial study in a hypotensive patient with hematemesis?**
  - A. Upper endoscopy
  - B. Upper GI series
  - C. Tagged RBC scan
  - D. Angiography

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- **All of the following are associated with malrotation EXCEPT:**
  - A. Asplenia
  - B. Gastroschisis
  - C. Omphalocele
  - D. Situs inversus totalis
  - E. Congenital diaphragmatic hernia

- **All of the following are associated with malrotation EXCEPT:**
  - A. Asplenia- part of heterotaxy syndrome
  - B. Gastroschisis- abdominal wall defect associated with malrotation
  - C. Omphalocele- abdominal wall defect associated with malrotation
  - D. Situs inversus totalis- associated with situs ambigus is according to Dahnert
  - E. Congenital diaphragmatic hernia- is associated with malrotation

D. Situs inversus totalis

- When situs cannot be determined, the patient has situs ambiguous or heterotaxy.1, 2, 3, 4, 5, 6, 7, 8 In these patients, the liver may be midline, the spleen absent or multiple, the atrial morphology unclear, and the bowel malrotated.
- Postnatally, malrotation, small bowel atresia or stenosis, bowel infarction, prolonged intestinal motility dysfunction, necrotizing enterocolitis, chronic short-gut syndrome, and hyperalimentation hepatitis may occur.
- Omphalocele is also associated with malrotation.
  - Emedicine
- Malrotation is found frequently in association with other congenital abnormalities. A form of malrotation called nonrotation almost always accompanies congenital diaphragmatic hernia and congenital defects of the abdominal wall (gastroschisis, omphalocele).
  - American pediatric surgical association

Malrotation associations

- Anomalies associated with **malrotation are, mainly, volvulus, diaphragmatic hernia, abdominal wall defects, hetrotaxia syndrome, situs inversus**
- The prenatal sonographic diagnosis has been reported in few cases, relying on nonspecific markers such as dilation of bowel loops, ascites, intra-abdominal cysts, situs inversus, and displacement of the fetal stomach.
- Symmetrically lobed lungs, midline liver, gastrointestinal malrotations, **asplenia, and polysplenia denote the heterotaxy syndrome**

Congenital Syndromes Associated with Colonic Malrotation

- Marfan's syndrome
- Mobile cecum
- Prune belly syndrome
- Asplenia or polysplenia
- Trisomy 21
- Thoracoabdominal wall defect
- Eagle-Barrett syndrome
- Cornelia de Lange's Syndrome
- Abdominal heterotaxy

Textbook of Gastrointestinal Radiology Gore and Levine

Rotational Anomalies

- Deviation from normal rotation and fixation occurs universally in children with omphalocele, gastroschisis, and diaphragmatic hernia.
- Variations of rotation may also be present in children with asplenia and polysplenia syndromes, duodenal atresia or stenosis and Hirschsprung's disease.
- However, malrotation frequently exists as an isolated anomaly

Textbook of Gastrointestinal Radiology- Gore and Levine

- **What is involved in the pathologic staging of rectal adenocarcinoma?**
  - A. Depth of tumor invasion only
  - B. Depth of tumor invasion and regional lymph nodes
  - C. Size of tumor and regional lymph nodes
  - D. Size of tumor and depth of invasion

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Rectal Cancer

- Dukes classification: In 1932, Cuthbert E. Dukes, a pathologist at St. Mark Hospital in England, introduced a staging system for rectal cancer.
- His system divided tumor classification into 3 stages, as follows:
  - Those limited to the rectal wall (Dukes A)
  - Those that extended through the rectal wall into extra-rectal tissue (Dukes B)
  - Those with metastases to regional lymph nodes (Dukes C)
- This system was modified by others to include subdivisions of stages B and C, as follows:
  - Stage B became B1 (ie, tumor penetration into muscularis propria) and B2 (ie, tumor penetration through muscularis propria).
  - Stage C became C1 (ie, tumor limited to the rectal wall with nodal involvement) and C2 (ie, tumor penetrating through the rectal wall with nodal involvement).
- Stage D was added to indicate distant metastases

- What is the rationale for performing MRI in the evaluation of perianal fistula?
  - Evaluation for other sinus tracts not seen at examination under anesthesia
  - Evaluate for complications
  - Surgical planning

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  - Surgical planning

MRI of Fistula

- For many years, examination under anesthesia (EUA) by an experienced colorectal surgeon was considered the reference standard for the detection of fistulas and any associated extensions, but it is now accepted that preoperative MRI has a sensitivity surpassing EUA [2, 3]. Furthermore, preoperative MRI frequently alters the surgical approach [4] and, most important, MRI-guided surgery can significantly reduce postoperative recurrence in complex cases by 75%
- MRI OF fistula in ano; AJR

Surgical planning

- **MR Imaging of Fistula in Ano**
- Knechtges P. M.; Willatt J. M.; Weadock W. *University of Michigan Health Systems, Ann Arbor, MI*
  - *Teaching Points:* 1. The importance of preoperative imaging to reduce postoperative recurrence of fistula in ano. 2. The normal MRI anatomy of the anal canal. 3. The classification of fistula in ano for operative planning. 4. Optimization of MRI technique for evaluation of fistula in ano.

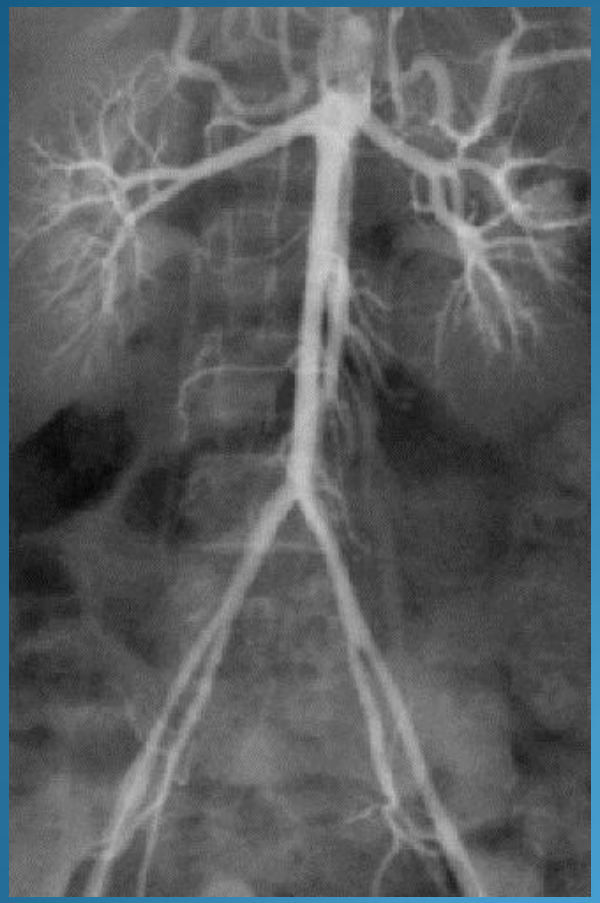
- Which of the following processes would most likely be associated with stenosis of the abdominal aorta?
  - Syphylitic aortitis
  - Takayasu arteritis
  - Temporal arteritis
  - Polyarteritis nodosa
  - Throboangiitis obliterans (Buerger's disease)
  - Fibromuscular dysplasia

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  - Fibromuscular dysplasia

Takayasu arteritis

- Angiographic involvement has been classified into four types depending on the sites of involvement (including the great vessels, thoracic aorta, and **abdominal aorta**) as well as whether the disease is stenotic (as in most cases) or with dilations (rarely occurs).
- (Primer 3rd Ed p669)
  - Takayasu's arteritis -Intimal proliferation and fibrosis lead to occlusion and narrowing of involved arteries.
    - Type 1: aortic arch
    - **Type 2: abdominal aorta**
    - Type 3: entire aorta
    - Type 4 pulmonary arteries

Takayasu arteritis



- Characteristic long, tapered, narrowing of the distal aorta and iliac vessels

- There are nonrounded areas of low attenuation on NECT. CECT demonstrates normal vessels coursing through these areas. What is the etiology?
  - (Cavernous) hemangiomas
  - Focal nodular hyperplasia
  - Focal fatty infiltration
  - Adenoma
  - Metastasis
  - Hepatocellular carcinoma

Focal fatty infiltration

- Focal fatty infiltration involves a geographic or fan-shaped portion of the liver with the same imaging features as diffuse infiltration (low density). Vessels run their normal course through the area of involvement. Focal fatty infiltration may simulate a liver tumor; however, the area of involvement has a density characteristic of fat. Focal fatty infiltration is most common adjacent to the falciform ligament, gallbladder, and porta hepatis.
- Medcyclopedia; Fatty Liver

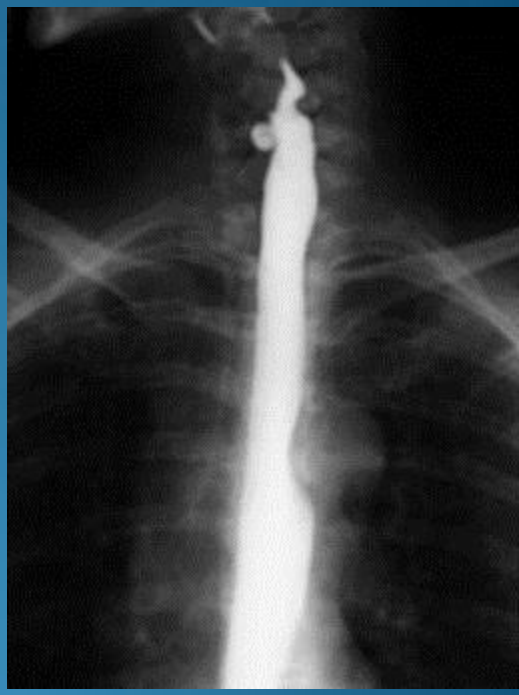
- A pharyngoesophagram demonstrates a contrast filling structure anterolaterally below the cricopharyngeus. This is most consistent with
  - Killian-Jamieson diverticulum
  - Zenker's diverticulum
  - Lateral pharyngeal diverticululm
  - Epiphrenic diverticulum

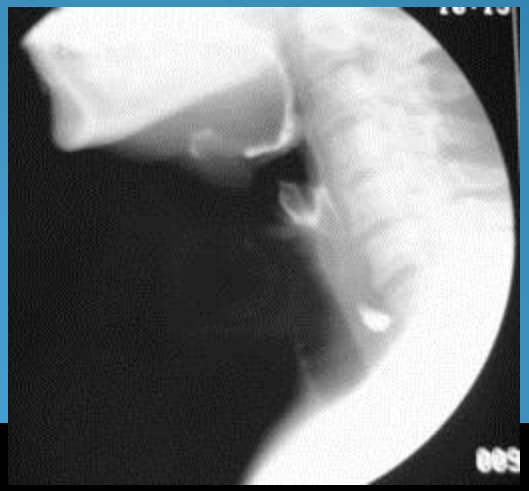
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Killian-Jamieson diverticulum

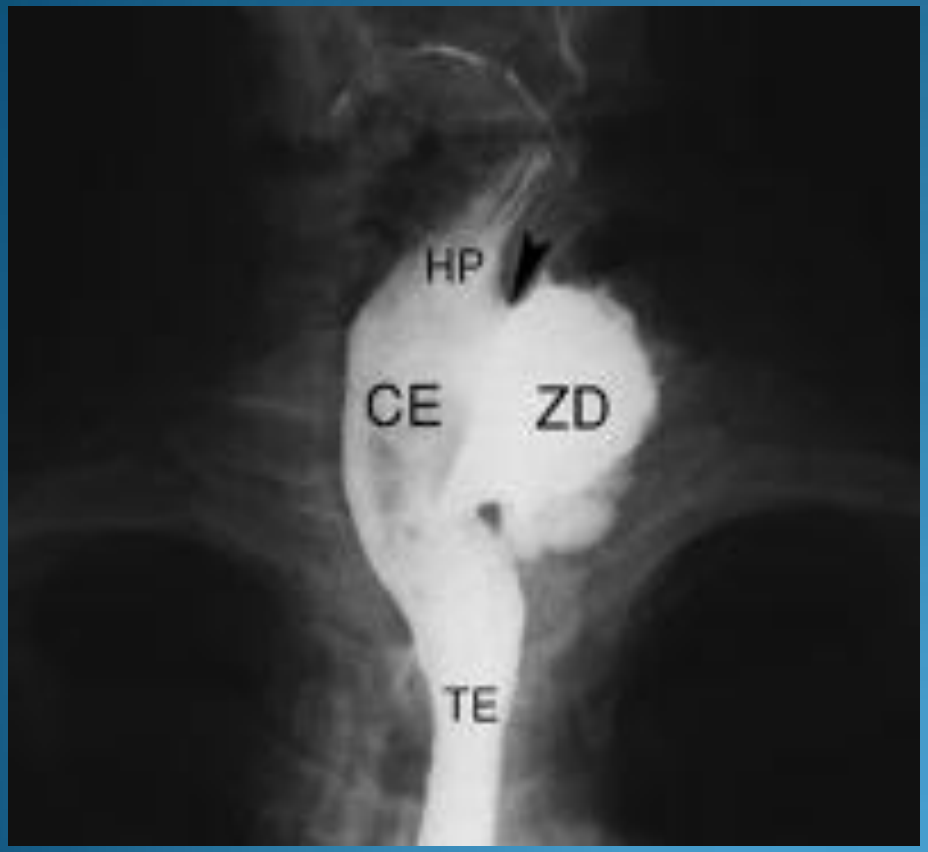
- From ACR learning file
- **Killian-Jamieson diverticula** are also termed proximal lateral cervical esophageal diverticula or lateral diverticula from the pharyngoesophageal junction area. Killian-Jamieson diverticula protrude **through the anterolateral wall of the proximal cervical esophagus** in a muscular gap just below the cricopharyngeal muscle, lateral to the longitudinal tendon of the esophagus just below its insertion on the posterior lamina of the cricoid cartilage. The gap is known as the Killian-Jamieson space.







Zenker Diverticulum



- ***FIGURE 29.10.*** **Zenker Diverticulum**

- Which vessel is most commonly involved in a Mallory-Weiss tear?
  - Short gastric artery
  - Left gastric artery
  - Gastroepiploic artery
  - Recurrent artery of St. Aloysius
  - Coronary vein

- Which vessel is most commonly involved in a Mallory-Weiss tear?
  - Short gastric artery
  - **Left gastric artery**
  - Gastroepiploic artery
  - Recurrent artery of St. Aloysius
  - Coronary vein

Left gastric artery

- Prophylactic embolization of the LGA without prior documented bleeding is advocated because almost 90% of the patients with this condition survive if the bleeding is controlled. The left gastric artery is involved in 85% of the cases of UGIB. (and Mallory-Weiss tear one of the most common causes of UGIB).
- UGIB occurs from a variety of etiologies. The pathophysiology of the bleeding is often mucosal erosion with subsequent hemorrhage. About 90% of the cases of UGIB arise from Mallory-Weiss tears, variceal hemorrhage due to portal hypertension, peptic ulcer disease, and gastritis.

- A patient with pancreatitis develops splenic vein thrombosis and bleeding gastric varices. Following successful conservative treatment, further therapy to prevent further bleeding is contemplated. What would the most appropriate procedure be?
  - Distal splenorenal shunt
  - TIPS
  - Splenectomy
  - Mesocaval shunt

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Splenectomy

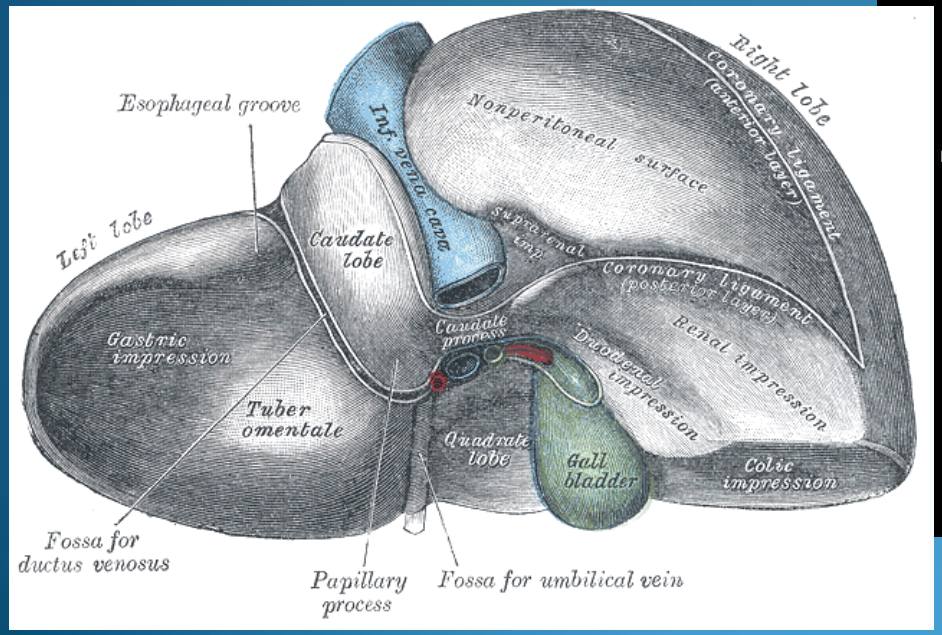
- Sengstaken-Blakemore tube in achieving immediate hemostasis for gastric varices.[2,3] Intended only as a temporizing measure, this intervention should be regarded as a bridge to more **definitive therapy. In the case of splenic vein thrombosis, this would include either splenectomy or splenic artery embolization.**
- Medscape General Medicine. 2006;8(3):72. ©2006 Medscape

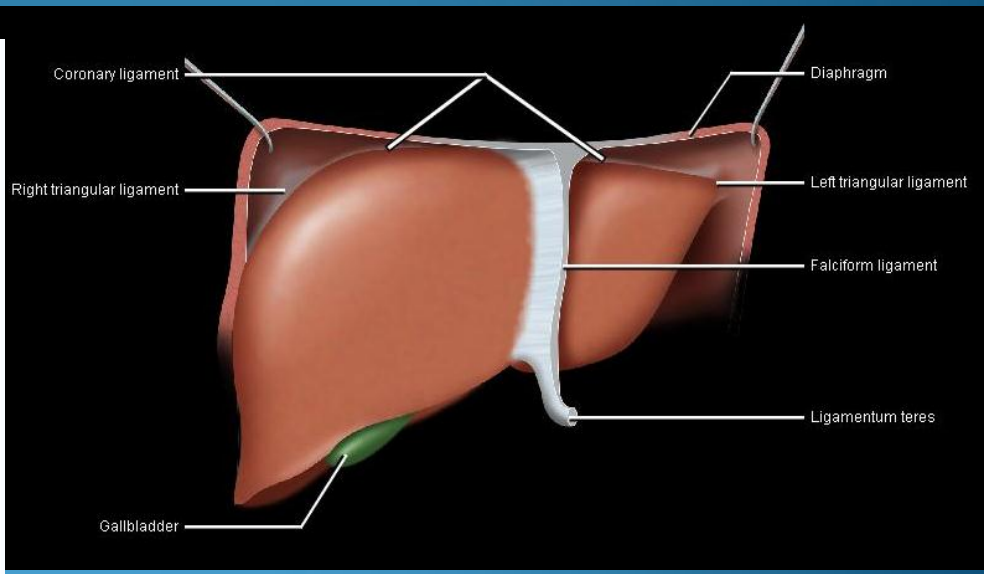
- Which of the following structures does not abut the caudate lobe of the liver?
  - Right lobe
  - Left lobe
  - IVC
  - Ligamentum venosum
  - Ligamentum teres

- Which of the following structures does not abut the caudate lobe of the liver?
  - Right lobe
  - Left lobe
  - IVC
  - Ligamentum venosum
  - **Ligamentum teres**

Ligamentum teres (Round Ligament)

- (does not abut caudate lobe)
- Netter plate 270.





Variant from 2003

- The round ligament of the liver is:
- a. Falciform ligament
- b. Ligamentum teres
- c. Congenital remnant of the ductus venosus

Variant from 2003

- The round ligament of the liver is:
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- What is the most common metastatic disease of the spleen?
  - Melanoma
  - Nasopharygeal carcinoma
  - Prostatic adenocarcinoma
  - Coloboma

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  - **Melanoma**
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  - Prostatic adenocarcinoma
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Melanoma

- Most splenic metastases are microscopic and are not detected by imaging studies. The most common tumors to metastasize to the spleen are malignant melanoma and lung, breast, ovary, prostate, and stomach carcinoma.
- AJR

RADIOLOGIC DIAGNOSIS OF SPLENIC METASTASIS*

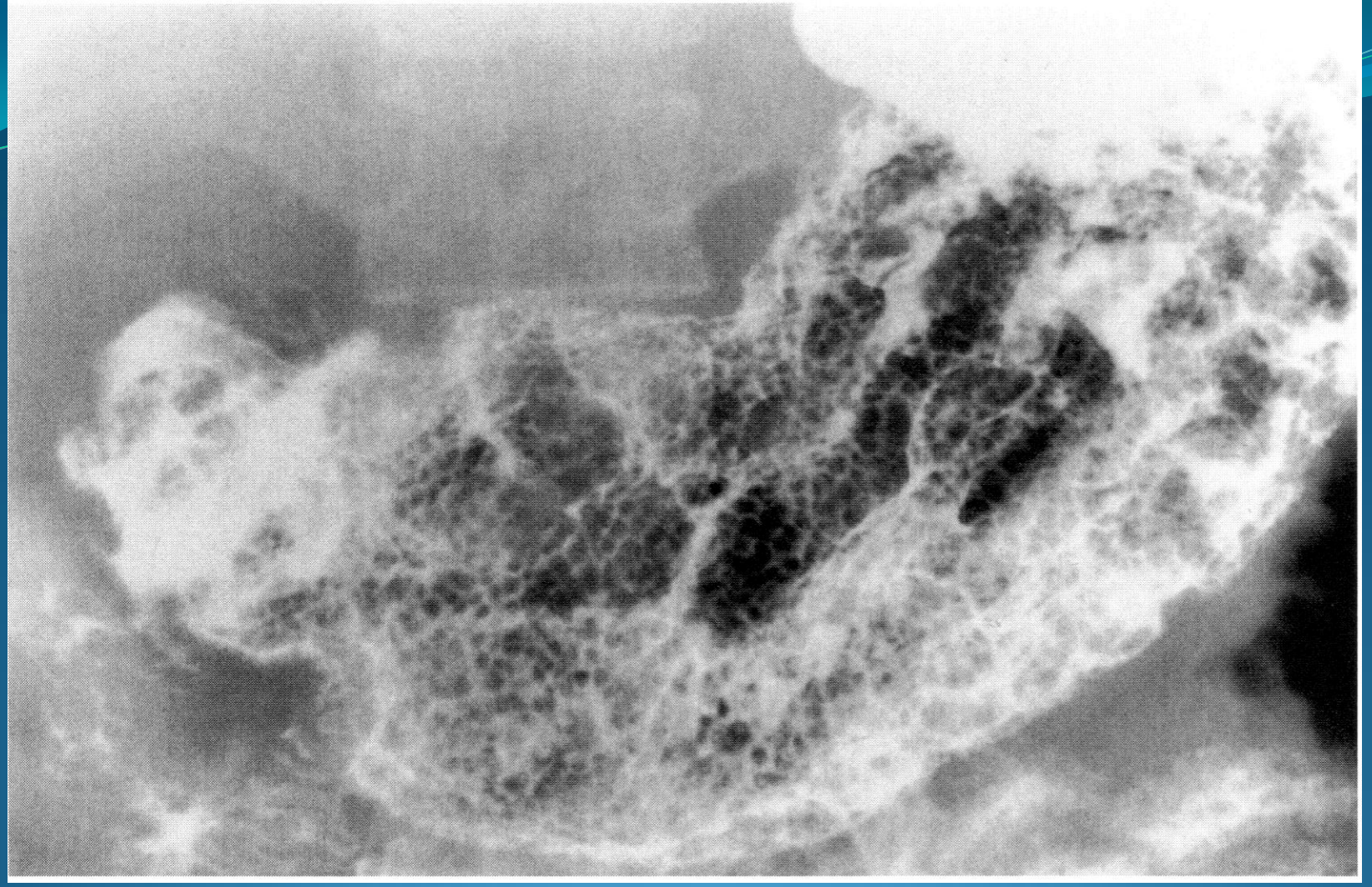
SPLENIC metastases are relatively rare, occurring in 2 to 4 per cent of large series of metastatic tumors.[6,8,18] The most common secondary tumors are sarcomas, principally the malignant lymphoma group.[12] Discrete nodular tumor masses in the spleen occur in reticulum cell sarcoma and Hodgkin's disease, but not in lymphocytic or lymphoblastic lymphomas.[1] Metastases from other tumors are rare,[3,14,15,19] and usually occur with generalized carcinomatosis, although isolated splenic metastases have been reported.[4,16] An exception to this generalization is widely disseminated melanoma where the spleen is involved in about one-half of the cases.[12]

- Barium exam shows multiple, < 1 cm polyps in the fundus and body of the stomach. Most likely due to?
  a. Peutz-Jegher
  b. Cronkite-Canada
  c. familial polyposis
  d. hyperplastic/inflammatory

- Barium exam shows multiple, < 1 cm polyps in the fundus and body of the stomach. Most likely due to?
  a. Peutz-Jegher
  b. Cronkite-Canada=
  c. familial polyposis
  d. **hyperplastic/inflammatory**= most common benign epithelial neoplaslm in the stomach, comprising 75-90% of all gastric polyps. (Gore and Levine pg 593)

Stomach Polyps

- **Hyperplastic/inflammatory**
  - make up 80% of gastric polyps. Sources state they can be seen anywhere: fundus and body (per Primer), antrum (per GI Requ), or anywhere per CHORUS. Use of PPI's may be assoc with fundal hyperplastic polyps.
  - round,small, sessile polyps; most common polyps in stomach, usually multiple in fundus and body, no premalignant, most common benign epithelial neoplasms in the stomach, comprising 75%-90% of all gastric polyps
  - Smooth, sessile, round or ovoid nodules ranging from 5-10mm
  - Occur as multiple lesions in the gastric fundus and body
  - Usually smaller than adenomatous polyps
- Peutz-Jegher = hamartomas.
  - Rare. autosomal dominant (50% sporadic).
  - primarily of SB, also: stomach, colon, occasionally of urinary or respiratory tract, mucocutaneous hyperpigmentation.
  - In young patients, small intestinal obstruction and intussusception are the main complications of Peutz-Jeghers syndrome. This is due to the small intestinal location of the polyps.
  - Cancer is the main consequence as patients with Peutz-Jeghers syndrome age (93% cumulative risk by age 64 y).
  - The major sites of cancer occurrence in order are small intestine, stomach, pancreas, colon, esophagus, ovary, lung, uterus, and breast (RR 15.2).
- Familial polyposis = adenomas.
  - characterized by the presence of hundreds to thousands of adenomatous polyps throughout the colon.
  - All patients with this syndrome develop colon cancer if they are not treated.
  - If the sigmoidoscopy or colonoscopy findings lead to a diagnosis of FAP, an esophagogastroduodenoscopy should be performed to evaluate for the presence of duodenal and periampullary adenomas.
  - Benign fundic gland polyps often are observed in the fundus and body of the stomach.
  - adenoma from FAP (only 5%, but 50% of FAP have HAMARTOMA in stomach).
  - Colon screening should begin at puberty for family members of familial polyposis
- Cronkite-Canada: hamartomas.
  - Rare.
  - This syndrome is hyperpigmentation, alopecia, glossitis, dystrophic nails and gastrointestinal manifestations (diarrhea, hamartomatous polyps, and exocrine pancreas insufficiency
  - small, sessile, pedunculated lesions, almost always distributed throughout the stomach, SB, and colon. Small to moderate-sized polyps carpet the mucosal surface, usually superimposed on thickened rugal folds. The small bowel may contain multiple small polyps from the duodenum to the terminal ileum. Colon and rectum may also be diffusely involved, but carpeting of the mucosa is not as extensive as that in the stomach. Textbook of GI Gore and Levine



Cronkite-Canada Syndrome

Double contrast study of the stomach shows carpeting of the mucosa with hamartomatous

Polyps superimposed on enlarged rugal folds

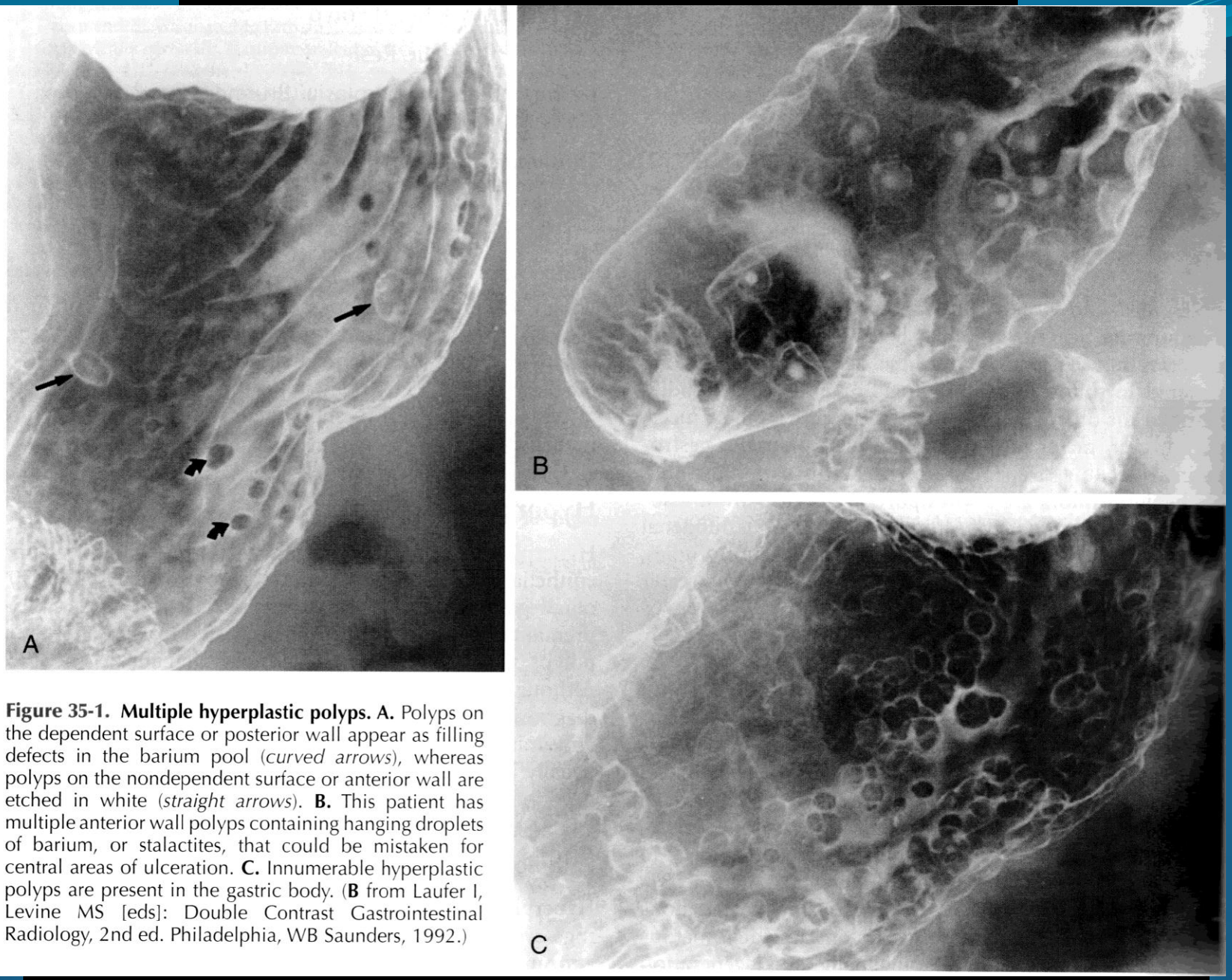


Figure 35-1. Multiple hyperplastic polyps. A. Polyps on the dependent surface or posterior wall appear as filling defects in the barium pool (*curved arrows*), whereas polyps on the nondependent surface or anterior wall are etched in white (*straight arrows*). **B.** This patient has multiple anterior wall polyps containing hanging droplets of barium, or stalactites, that could be mistaken for central areas of ulceration. **C.** Innumerable hyperplastic polyps are present in the gastric body. (**B** from Laufer I, Levine MS [eds]: Double Contrast Gastrointestinal Radiology, 2nd ed. Philadelphia, WB Saunders, 1992.)

[redacted]

2005

[redacted]

- H. pylori not associated with.
- a. gastric ulcers.
- b. duodenal ulcers.
- c. Zollinger-Ellison.
- d. MALT lymphoma.

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- a. gastric ulcers.
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- **c. Zollinger-Ellison.**
- d. MALT lymphoma.

Zollinger-Ellison

- (c) ZE-- The Zollinger Ellison syndrome is the result of excessive production of gastrin that produces excessive gastric acidity. It can occur as a component of type 1 multiple endocrine neoplasia syndrome, abbreviated to MEN1 or it can occur in isolation.
- The tumour is usually in the duodenum, the pancreas or abdominal lymph nodes but can be at distant sites. It stimulates hyperplasia of the acid secreting cells and continual high output, even at times of normal rest.
- H. Pylori is not associated with the peptic ulcers that occur with ZE.
- Gastroenterology 1997 Jan/
- MALT—mucosa associated lymphoid tissue—low grade lymphoma arises as a result of antigenic stimulation—H.Pylori. AFIP—44-448

- Biliary dilatation s/p transplant.
- a. portal vein occlusion.
- b. hepatic artery occlusion.
- c. hepatic vein occlusion.

hepatic artery occlusion

- I think this question may be referring to the effects of liver transplant on the biliary system. According the notes below biliary strictures are secondary to hepatic artery ischemia during transplant or post operatively. So I guess the answer may be B. ????/
- Management of Late Post-Transplant Biliary Complications
- Anastomotic Strictures
- Anastomotic strictures may be diagnosed by Doppler ultrasound or angiography. These are often progressive over time and difficult to dilate radiologically, often requiring revision of the biliary anastomosis (in approximately 50% of patients). Dilations are usually multiple and done via the transhepatic route. These should be attempted at the transplant center or by an experienced interventional radiologist trained in post-liver transplant biliary radiology.
- Intrahepatic Biliary Strictures
- Intrahepatic biliary strictures are often secondary to ischemia of the hepatic artery (intraoperative or postoperatively), prolonged preservation time, ABO mismatch or chronic rejection. These strictures are progressive over time. Strictures at the hepatic bifurcation may be amenable to dilatation or stenting. Intrahepatic biliary strictures are not amenable to surgical intervention, are progressive and often require retransplantation. In this group of patients, liver enzymes (especially alkaline phosphatase and GGT) and total bilirubin progressively increase and the liver biopsy reveals ductopenia and chronic cholestasis. A small percentage of patients on cyclosporine who develop chronic rejection may benefit from switching to tacrolimus.
- http://med.stanford.edu/shs/txp/livertxp/outpatient.management/management.html

- Which does not typically involve the terminal ileum.
- a. TB
- b. Yersinia.
- c. Salmonella.
- d. Giardia
- e. Campylobacter.

- Which does not typically involve the terminal ileum.
- a. TB
- b. Yersinia.
- c. Salmonella.
- **d. Giardia**
- e. Campylobacter.

D. Giardia

- After ingestion of cysts, excystation, trophozoite multiplication, and colonization of the upper small bowel occur.
- Campylobacter(helibacter) Infection: mimics appendicitis
- Salmonella: Granular or diffuse ulcerative colitis may be present with enlarged Peyer's patches in the terminal ileum
- Yersinia: Involves mainly the distal small bowel although diffuse edema with apthoid ulcers in the colon has been reported.
- TB: Ileocecal involement is the most common

[redacted]

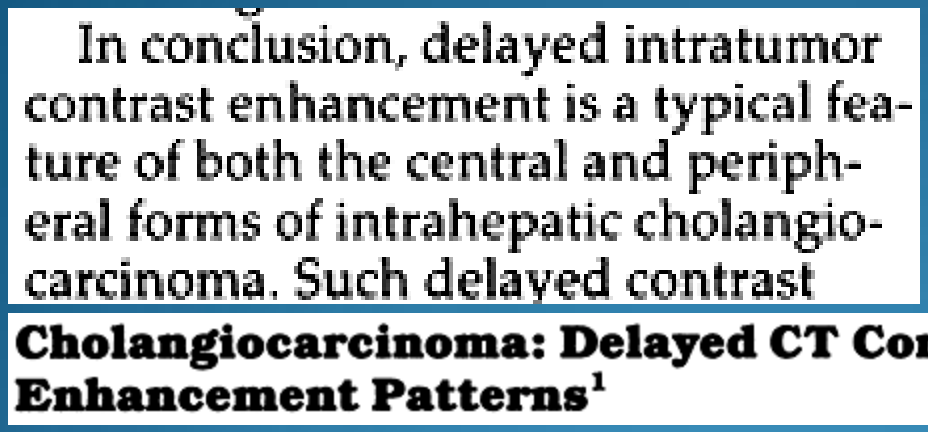
- Levine

- Delayed CT scan of the liver at 10 to 20 minutes is most usable for a diagnosis of:
  - Cholangiocarcinoma
  - FNH
  - Hemangioma
  - Colorectal mets
  - *Hepatoma*
  - *Adenoma*

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Cholangiocarcinoma

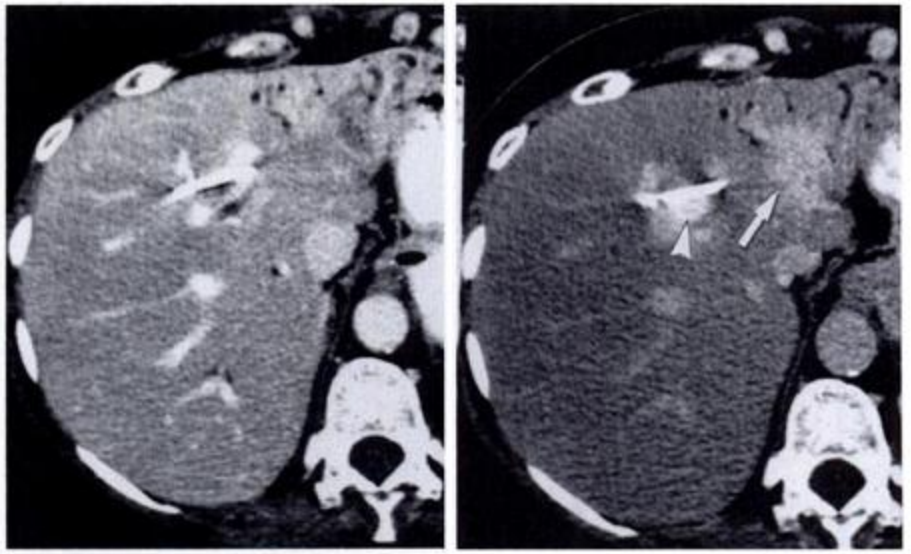
- Cholangiocarcinoma:
  - NECT: well defined predominatly homogeneous hypdense mass with lobular margins, hypodense satellite daughter nodules, stippled chunky calcifications(18%)
  - CECT: thin or thick, rim-like enhancement frequently seen around periphery of tumor on arterial phase images , progressive gradual and concentric filling on delayed phase images(usually not isodense to blood, unlike cavernous hemangioma)
  - Substantial delayed enhancemenT is common (greater than that of liver parenchyma)-74%, Fibrotic component contributes to delayed tumoral contrast-enhancement.
- FNH:
  - NECT: Isodense or hypodense to normal liver
  - CECT: Arterial phase: transient intense hyperdensity, central scar is hypodense
  - Portal venous phase: Hypodense or isodense to normal liver
  - Delayed scan: Idosdense to liver with the central scar being hyperdense
- Hemangioma:
  - NECT: well-circumbscribed, spherical to ovoid mass isodense to blood
  - CECT: Arterial phase: early peripheral, nodular or globular, discontinous enhancement.
  - Venous phase: progressive centripetal enhancment to uniform filling, still idodense to blood vessels
  - Delayed phase: persistent complete filling
- Hepatoma(HCC): may have identical imaging features as hepatic adenoma,
- Adenoma:
  - NECT: well-defined spherical mass which is hypodense to isodense due to lipid
  - CECT: arterial phase: heterogenouse, hyperdense enhancement
  - Portal venous phase: less heterogeneous, can be hyper,hypo or iso
  - Delayed phase(10min): homogenouse, hypodense, enhancement does no persist dud to arteriovenouse shunting



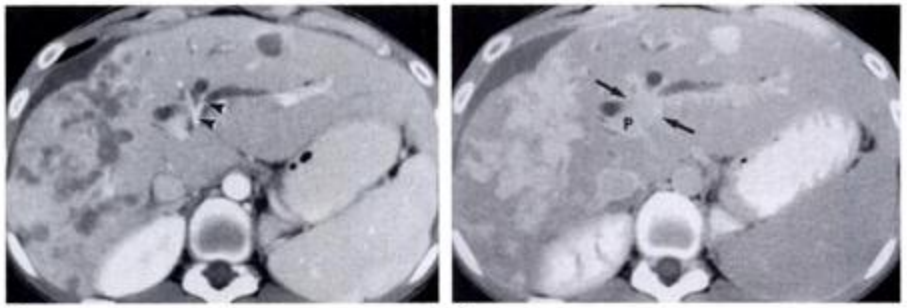
In conclusion, delayed intratumor contrast enhancement is a typical feature of both the central and peripheral forms of intrahepatic cholangiocarcinoma. Such delayed contrast

Cholangiocarcinoma: Delayed CT Contrast Enhancement Patterns[1]

- Radiology
- in the proper clinical setting, detection of a hypodense hepatic lesion with peripheral enhancement, biliary dilatation, and contrast enhancement on delayed images are highly suggestive of peripheral intrahepatic cholangiocarcinoma. (ncbi)



2a. 2b.



3a. 3b.

Figures 2, 3. **(2)** Central cholangiocarcinoma with homogeneous markedly hyperattenuating delayed enhancement in a 49-year-old woman. **(a)** CT scan obtained in the portal venous phase demonstrates atrophy of the left hepatic lobe associated with moderate left intrahepatic ductal dilatation. A vague nonspecific area of hypoattenuation is seen at the confluence of the dilated ducts; however, a definitive diagnosis is not possible. A biliary drainage catheter is present in the right lobe of the liver. **(b)** Sixteen-minute postcontrast delayed image depicts the suspected mass due to the marked contrast enhancement (arrow) at the confluence of the dilated bile ducts and defines the tumor margins. A second region of tumor is also seen adjacent to the biliary catheter (arrowhead); the presence of this lesion was not suspected on images obtained in the portal venous phase. Both masses show homogeneous markedly hyperattenuating (attenuation greater than that of blood vessels) delayed enhancement. **(3)** Diffuse cholangiocarcinoma with homogeneous markedly hyperattenuating delayed enhancement in a 30-year-old woman. **(a)** Image obtained in the portal venous phase depicts marked central intrahepatic ductal dilatation but without a mass lesion seen centrally. Multiple hypoattenuating intrahepatic lesions are present, some of which have thin peripheral enhancement. Differentiation of tumor from dilated bile ducts is difficult. Focal capsular retraction and perihepatic ascites are evident. Arrowheads indicate hepatic artery branches. **(b)** Twenty-one–minute postcontrast delayed image demonstrates homogeneous markedly hyperattenuating (attenuation greater than that of blood vessels) delayed enhancement within the diffuse tumor, while dilated ducts remain hypoattenuating. The central tumor (arrows) can be clearly identified; it encases the hepatic arterial branches seen in **a**. The tumor abuts the right portal vein branch (*P*).

- On barium exam, endometriosis involving small bowel would resemble
- a) metastatic melanoma
- b) intraperitoneal metastases
- c) GI stromal tumor
- d) Lipoma

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- a) metastatic melanoma
- **b) intraperitoneal metastases**
- c) GI stromal tumor
- d) Lipoma

B. intraperitoneal metastases

- Double Contrast Gastrointestinal radiology-, Levine:
- The rectosigmoid is a common site of colonic involvement by endometriosis. These hormonally stimulated endometriosis implants may cause mass effect, crenulation, and tethering of the anterior border of the rectosigmoid due to bleeding and subsequent fibrosis in the wall of the bowel. Additional implants may be found in the sigmoid and cecum. Intraperitoneal metastases, inflammatory disease, and endometriosis may produce similar changes in the rectosigmoid colon, so that the clinical history is essential for differentiating these conditions,
- Case report of endometriosis involvement of the small bowel:
- Enteric lesions of endometriosis are generally serosal, usually eccentric and typically multiple. Involvement of the mucosa is uncommon. Thus, though endometrial deposits of the small bowel may lead to obstruction, bleeding is uncommon[1].
- The findings on small bowel examination with barium though helpful in morphological diagnosis, are not specific. The changes include fixity of loops produced by adhesions; filling defects produced by serosal deposits and occasional changes suggestive of regional enteritis[2]. If obstruction is present, radiological examination shows its site, nature and extent.



Ileal endometriosis. Spot image obtained during enteroclysis shows a focal, smooth, extrinsic mass impression (open arrows) on the mesenteric border of a pelvic loop of ileum. At a second site, there is another focal extrinsic mass impression (arrow) and tethering of folds toward the mesenteric border. The ileal mucosa is preserved. The distal ileum (i) is collapsed. These endometriosis implants in the ileum are indistinguishable from intraperitoneal metastases to the small bowel.



Ileal endometriosis. Axial CT through the pelvis shows ileal loops (long arrows) pulled toward the mesentery with associated tethering of folds (small arrow). The submucosa has slightly low attenuation.

Ileal **endometriosis in a 28-year-old woman. Anteroposterior spot image from double-contrast barium enema study with retrograde filling of the ileum shows an annular lesion (arrow) in the terminal ileum, with spiculated folds and relatively abrupt borders.**



- What malignancy is NOT associated with non-polyposis hereditary colonic cancer syndromes
  - a) endometrium
  - b) stomach
  - c) esophagus
  - d) ovary
  - e) breast
  - f) cholangiocarcinoma

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  - a) endometrium
  - b) stomach
  - c) esophagus
  - d) ovary
  - **e) breast**
  - f) cholangiocarcinoma

Answer: E) BREAST

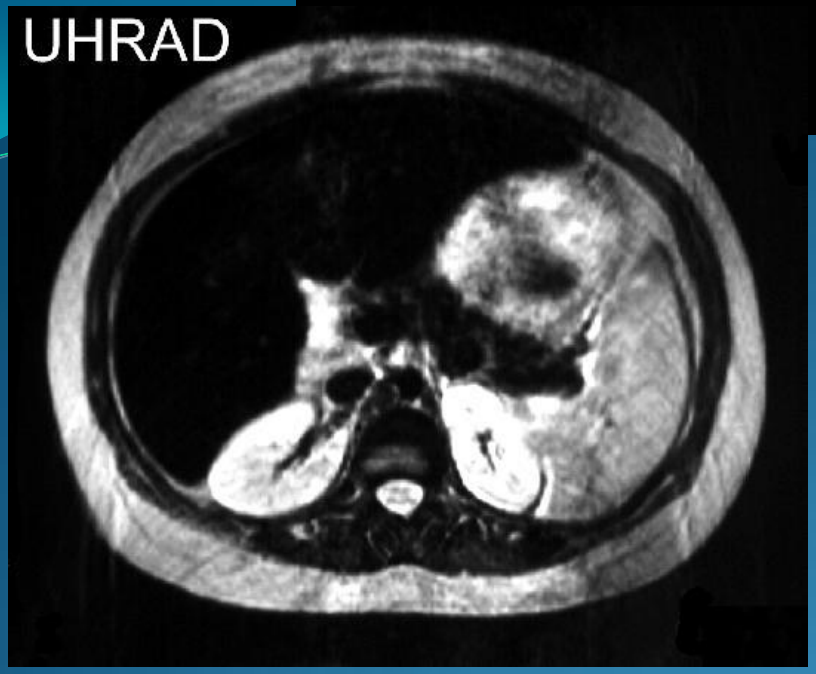
- Hereditary Non-Polyposis Colorectal Cancer (HNPCC) is the most common form of hereditary colorectal cancer. It accounts for approximately 3% to 5% of all colorectal cancers. Individuals who have this condition are at increased risk of developing colorectal cancer. Additionally, women in families with HNPCC have an increased chance of developing cancer of the endometrium
- HNPCC can also be associated with cancer of the:
  - small bowel
  - stomach
  - ureter
  - kidney
  - ovary
  - pancreas
  - -brain
  - hepatobiliary
  - skin (sebaceous carcinoma)
- http://www.mtsinai.on.ca/familialgicancer/Diseases/HNPCC/default.htm

- MR of the abdomen shows HSM with low signal in liver and pancreas
- a) primary hemachromatosis
- b) Fe overload from transfusion

- MR of the abdomen shows HSM with low signal in liver and pancreas
- **a) primary hemachromatosis**
- b) Fe overload from transfusion

Answer: Primary Hemachromatosis

- Primary Hemachromatosis: increased intestinal absorption of Fe leads to Fe within predominantly parenchymal cells (hepatocytes, pancreas, and heart). MRI shows low signal on T2 in panc and liver. T2*-gradient echo is most sensitive- low signal in panc and liver.
- Secondary Hemachromatosis: due predominantly to Fe overload from multiple transfusions. Fe is within the macrophages (not predominantly hepatocytes).. MRI shows low signal in liver and spleen on T2 and T2*-gradient echo.
- Increased attenuation in the liver on CT differential:
- Fe deposition
- Glycogen storage diseae
- Amiodorone
- Wilson's Disease
- (AFIP: Imaging of Chronic Liver Disease/Dr. Levy and Dr. Leyendecker)





Primary Hemochromatosis

- The first picture is a T1 weighted axial image through the upper abdomen demonstrating abnormally low and homogeneous signal in the liver. The splenic signal is normal and approaches that of muscle. The second picture is a T2 weighted axial image of the abdomen acquired 1 cm below the first. This demonstrates decreased signal in the liver, bone marrow and the pancreas. The signal of the spleen is again normal.

- What is most associated with pseudocirrhosis
- a) IBD
- b) colon CA
- c) breast CA
- d) liver transplant
- e) primary sclerosing cholangitis

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- a) IBD
- b) colon CA
- **c) breast CA**
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Breast CA

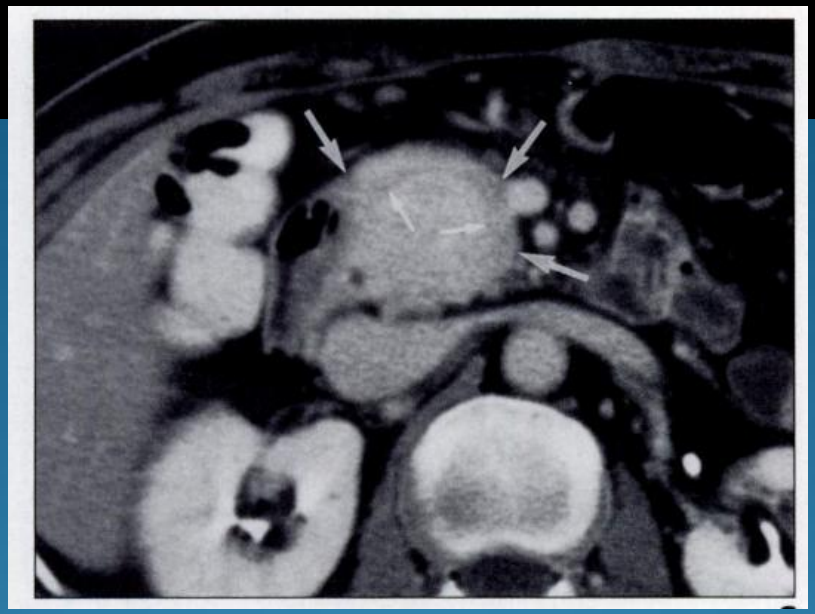
- In patient's with mets to the liver, treatment with chemo leads to shrinkage of the mets and associated retraction of the liver capsule and scarring. Between areas of scarring, the liver parenchyma is regenerative. This entity is referred to as pseudocirrhosis because it resembles macronodular cirrhosis. Because breast CA mets are the most chemo sensitive (and colon hepatic mets are not very chemo sensitive), breast mets shrink and can lead to pseudocirrhosis. This entity was first described in breast mets per Dr. Dyer.
- Imaging findings: lobular liver margin, volume loss, caudate hypertrophy, portal HTN
- (CT and MRI of Cirrhosis and its Mimics: Gupta, et al. AJR 2004, 183:1595-1601 and Dr. Dyer).
- CT of the liver in patients with metastatic breast carcinoma treated by chemotherapy: findings simulating cirrhosis ; AJR

- What is NOT true of autoimmune pancreatitis
- a) elevated gammaglobulin and IgG
- b) enlarged pancreas
- c) irregular and narrowed pancreatic duct
- d) lymphocytic infiltrate and fibrosis
- e) pain and fever

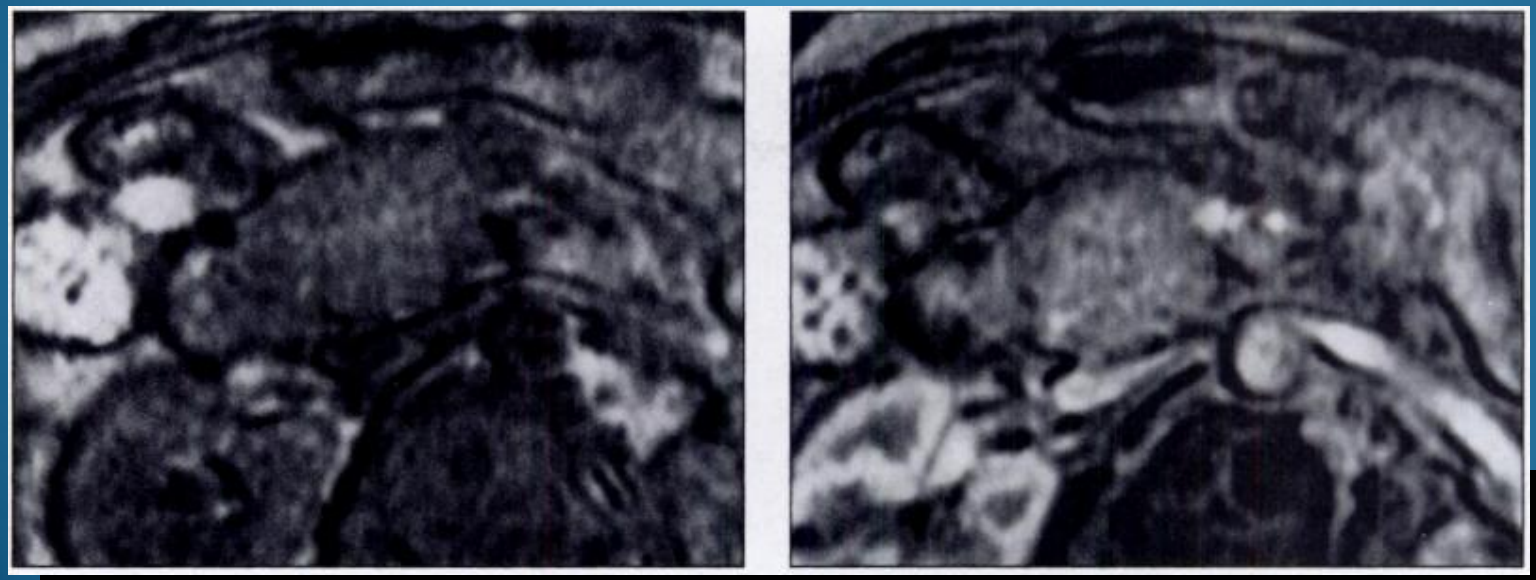
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pain and fever

- Per Dr. Oliphant all the other answers are true.
- Autoimmune pancreatitis (also known as lymphoplasmacytic sclerosing pancreatitis) is characterized by a localized to diffuse enlargement of the pancreas, usually involving the head of the panc with assoc irregular stenosis of the panc duct. It can be isolated or assoc with an autoimmune disorder. Usually in middle age; M>F 2:1.
- Pt's have:
- Hypergammaglobulinemia
- Eosinophilia and autoantibodies
- Histologically there is fibrosis and periductal inflam with lymphocytes and plasma cells
- Serum IgG is elevated
- Pt may have postive ANA, anti-smooth muscle antibodies
- On CT: there is diffuse or localized enlargement of the panc with no calcifications.
- On ERCP: there is narrowing of the main panc duct
- This disease is reversible with steroids, so it is an important diagnosis to make. It is diagnosed by EUS-FNA. This disease can cause mass-like enlargement of the panc head that can cause obstruction and jaundice, mimicking CA.
- (Google, Nov. 2003 and Center for Advanced endoscopy and the Pancreaticobiliary Center at UCLA)
- Autoimmune Pancreatitis: CT and MR characteristics; AJR



- Hypointense capsule, enlargment panc head



- Mass in the region of pancreatic head/duodenum that is hypovascular
- a) islet cell tumor
- b) GIST
- c) adenocarcinoma
- d) microcystic adenoma

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adenocarcinoma

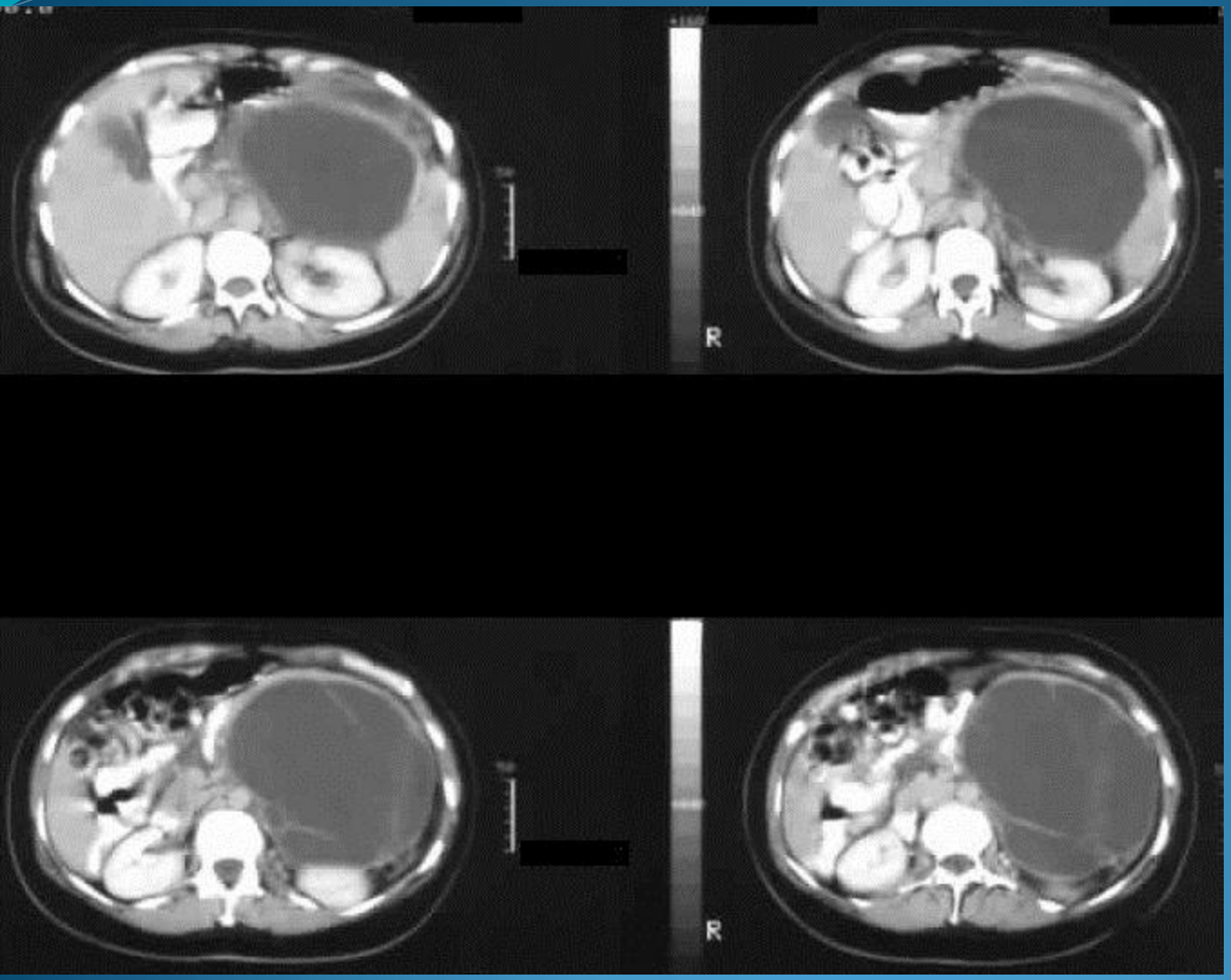
- Answer: per Dr. Oliphant
- Adenocarcinoma: 40 sec. after injection of contrast (panc phase) the normal pancreas enhances and adenoCA does not enhance.
- Islet Cell tumor: hypervascular: enhances early
- Microcystic adenoma (serous cystadenoma): small cysts arranged around a central scar/can have thin, radiating septa. The scar and septa can enhance (usually delayed enhancement). Have lobular outer margin. Do not communicate with panc duct. 70% occur in female >60 yo ("grandmother lesion")
- (Dr. Oliphant panc lecture 2/17/06 and AFIP: Pancreatic Neoplasms/Dr. Levy)

- another version. hypervascular mass pancreaticoduodenal area – all EXCEPT
  - insulinoma
  - gastrinoma
  - mucinous cystic neoplasm

- another version. hypervascular mass pancreaticoduodenal area – all EXCEPT
  - insulinoma
  - gastrinoma
  - **mucinous cystic neoplasm**

mucinous cystic neoplasm

- Answer: Mucinous cystic neoplasm.
- Insulinoma and gastrinomas are islet cell tumors. They are homogeneously enhancing on arterial phase.
- 3 types of islet cell tumors: insulinoma>gastrinoma>glucagonoma
- Mucinous cystic neoplasm (mucinous cystadenoma or cystadenocarcinoma)—80% are females, mean age 49 ("mother tumor"). Usually in the panc tail (85%). On imaging, they are well-circumscribed, round lesions with a smooth contour. Multilocular cysts with septations which can enhance. Can have mural nodules.
- (same references as question 128)



- Enhanced axial CT scans in the same patient as in Image 2 shows a large septate mass in the left hypochondrium with rim enhancement and enhancement of the septa. At surgery, a mucinous adenoma was confirmed. Note the smooth external contour typical of MCN

- What does not resemble achalasia?
  - A) Chagas
  - B) lung CA
  - C) dermatomyositis
  - D) Diabetes mellitus
  - E) Cancer in gastric cardia

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  - E) Cancer in gastric cardia

C) dermatomyositis

- A barium swallow allows evaluation of esophageal dysmotility
- Secondary achalasia is relatively uncommon. This condition exists when a process other than intrinsic disease of the esophageal myenteric plexus is the etiology. Examples of maladies causing secondary achalasia include certain malignancies, diabetes mellitus, and Chagas disease. *Emedicine*
- An AJR article about secondary achalasia listed lung cancer and gastric cardia tumors as causes.

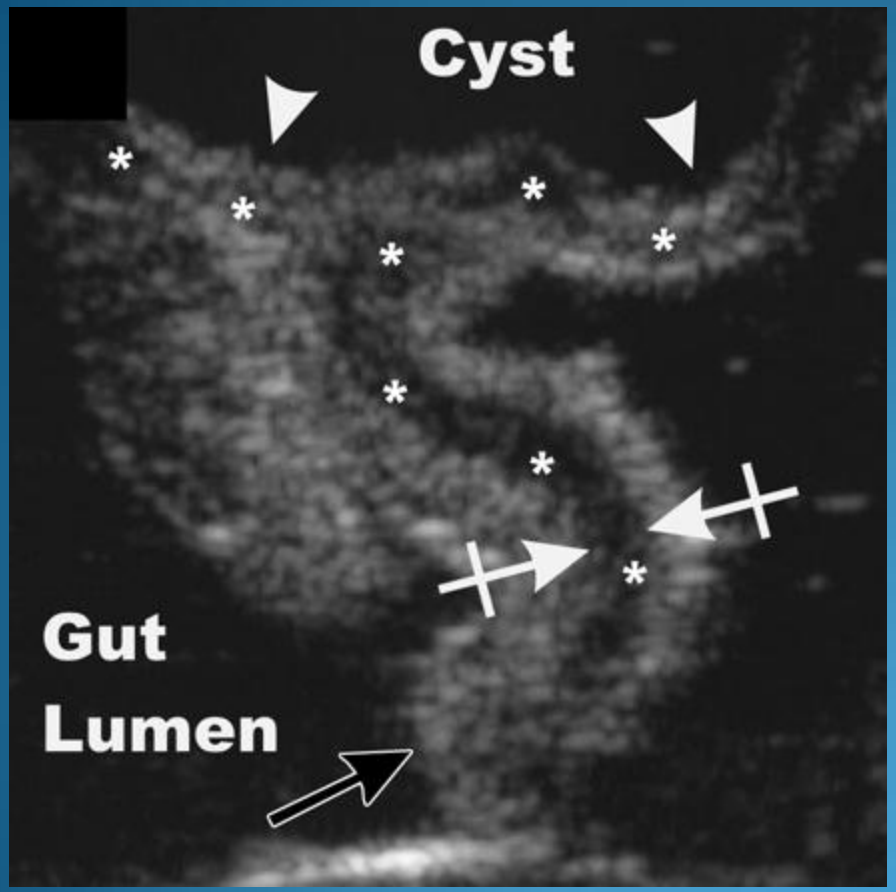
- Which is NOT true of duplication cysts
- a) neurenteric cysts are associated with vertebral body defects
- b) most common near ileum
- c) muscularis is hyperechoic to mucosa
- d) do not normally communicate with bowel

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- **c) muscularis is hyperechoic to mucosa**
- d) do not normally communicate with bowel

muscularis is hyperechoic to mucosa

- the muscularis is sonolucent with respect to the echogenic mucosa
- Duplication Cysts: secondary to abnormal canalization of the GI tract during embryological development at 8 weeks. Abnormal canalization leads to formation of 2 channels—one persists as the duplication cyst. Ileum is most common location. Generally do not communicate with the bowel. Dup cysts have a smooth muscle wall and a GI-type mucosa (stom, small bowel mucosa, etc). On US, double halo sign= sonolucent smooth muscle and echogenic mucosa is characteristic of a dup cyst.
- The characteristic sonographic appearance consists of an inner hyperechoic rim correlating to the mucosa–submucosa and an outer surrounding hypoechoic layer reflecting muscularis propria
  - Sonographic Pitfalls in the Diagnosis of Enteric Duplication Cysts

Intestinal duplication cyst



- Intestinal duplication cyst specimen from 5-month-old girl. Sonogram of specimen depicts echogenic cyst mucosa (*arrowheads*) and hypoechoic shared muscularis (*white arrows*). Note thicker native ileal mucosa (*black arrow*). Asterisks show course of muscularis propria. Gut lumen and walls are enveloped by ultrasound gel.

- What most accurately represents portal venous pressure
- Hepatic vein wedge pressure
- Free hepatic vein pressure
- Free plus wedge hepatic vein pressure
- Wedge minus free hepatic vein pressure
- Free minus wedge hepatic vein pressure

?

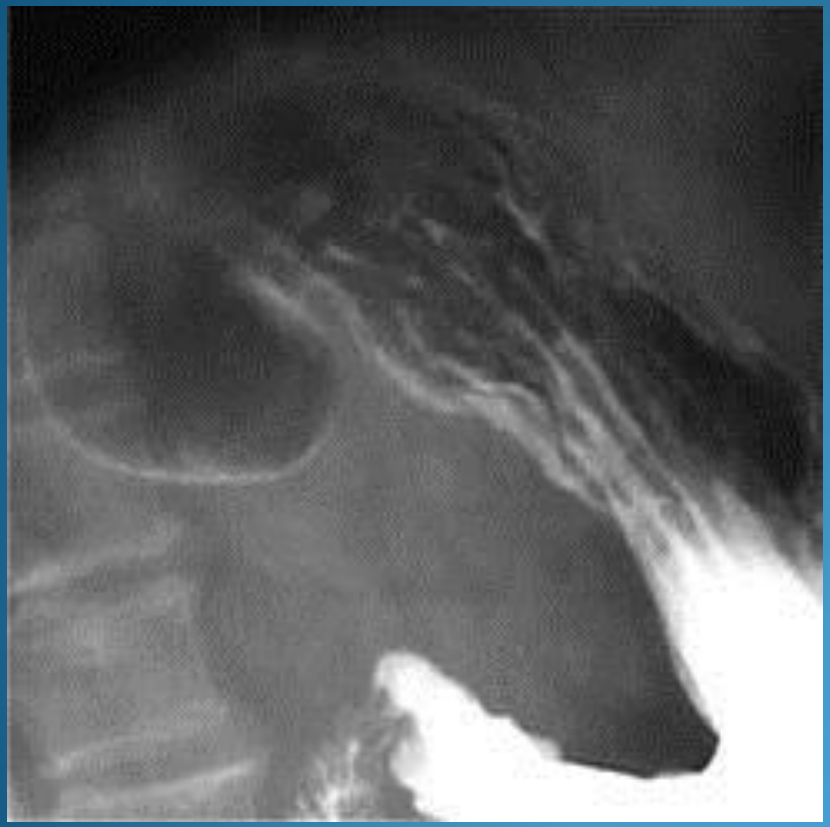
- Hepatic wedge pressure- free hepatic vein pressure per emedicine: The hepatic venous-pressure gradient (HVPG) is an accurate estimate of portal venous pressure. The HVPG is determined angiographically by subtracting the free hepatic venous pressure from the hepatic venous wedge pressure.
- Normal portal-systemic gradient is 5 mmHg: >6mmHg represents indirect evidence of portal HTN.; >12mmHg correlates with increased risk of variceal bleeding.
- (IR Case Review Series and Dr. Dyer)

- Where are gastric diverticula most likely to occur
- posterior fundus
- gastric cardia
- incisura angularis

- Where are gastric diverticula most likely to occur
- **posterior fundus**
- gastric cardia
- incisura angularis

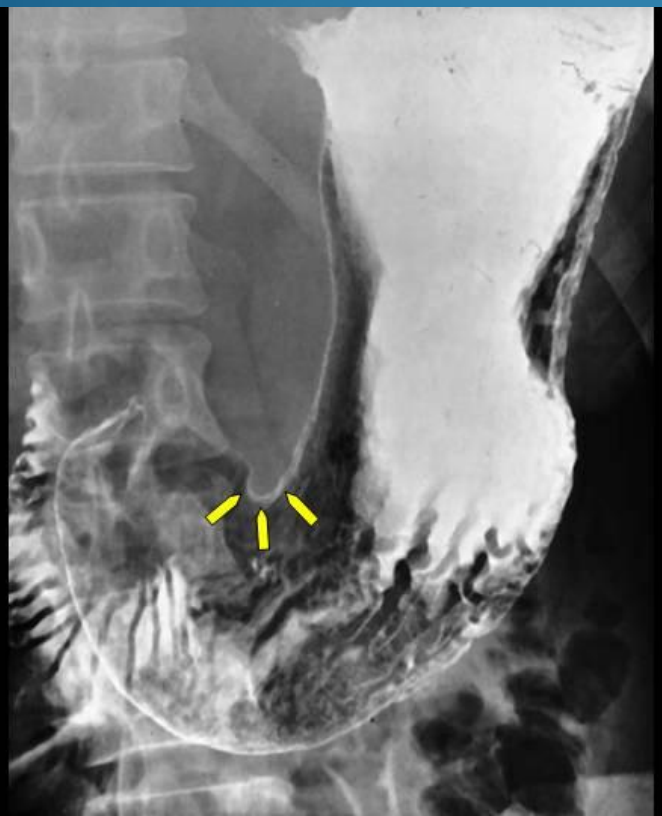
Posterior fundus

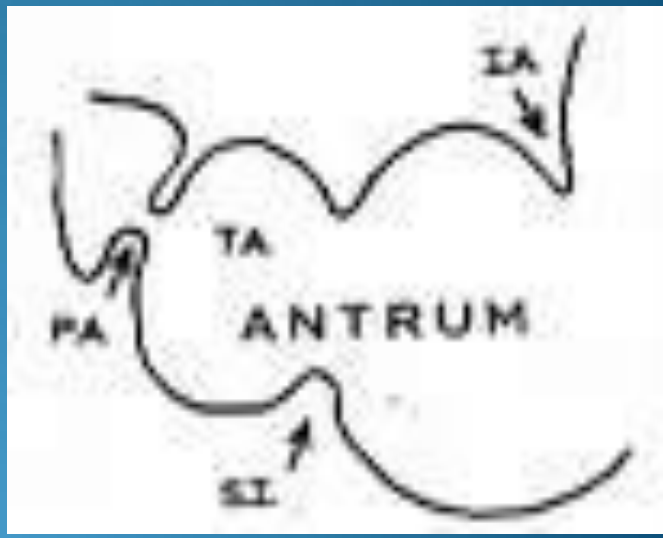
- A gastric diverticulum, which usually arises from the posterior wall of the fundus (see Image 10), should not be confused with a large ulcer.
  - *Emedicine; Gastric ulcer*



- Large gastric diverticulum in the fundus

- *But, for those of us not completely sure what the incisura angularis is:*





- What is true of cricopharyngeous
- a) indents the anterior esophagus
- b) at C2
- c) inferior to Zenker's
- d) inferior to cervical esophagus
- e) used in phonation

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- d) inferior to cervical esophagus
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inferior to Zenker's

- ZD occurs superior to CP secondary to CP dysfunction which leads to increased intraluminal pressure in the cervical esophagus at Killian's dehiscence (area of potential weakness in midline between horizontal and oblique fibers of the inferior constrictor muscle approx. at the level C5/6. When small, ZD extends posteriorly, best seen on lat projection. When large, ZD may project laterally, usually on the left side. (GI REQ 30)

- True about carcinoid
  - A) Appendiceal carcinoids are usually benign
  - B) Patients with carcinoid syndrome usually present with distant metastases
  - C) Left cardiac fibrointimal elastosis
  - D) Most patients may have carcinoid sydrome

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  - C) Left cardiac fibrointimal elastosis
  - D) Most patients may have carcinoid sydrome

Appendiceal carcinoids are usually benign Patients with carcinoid syndrome usually present with distant metastases

- The most common appendiceal neoplasm is carcinoid. Over 90% of GI carcinoids arise from either appendix or distal ileum. These lesions are almost always benign and rarely cause carcinoid syndrome. 10% of pt's w. carcinoid have carcinoid syndrome. Hepatic mets are usually present w/ carcinoid syndrome. Carcinoid heart dz is assoc w/ right-sided valvular dysfunction and CHF. (GI REQ 286, AFIP)
- *emedicine*

Not associated with Budd-Chiari

- A) Paroxsysmal nocturnal hemoglobinuria
- B) Bechet's disease
- C) Polycythemia rubra vera
- D)Chronic viral hepatitis
- E) Fanconi's anemia

Not associated with Budd-Chiari

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- **E) Fanconi's anemia**

Fanconi's anemia

- Budd-Chiari syndrome is an uncommon condition induced by thrombotic or nonthrombotic obstruction to hepatic venous outflow. The syndrome most often occurs in patients with underlying thrombotic diathesis, including myeloproliferative disorders, such as polycythemia vera and paroxysmal nocturnal hemoglobinuria, pregnancy, tumors, chronic inflammatory diseases, clotting disorders, and infections. (www.emedicine.com/med/topic2694.htm)
- Fanconi anemia (FA) is the most frequently reported of the rare inherited bone marrow failure syndromes. The major cause of death in FA is bone marrow failure. Bone marrow failure usually presents in childhood, with petechiae, bruising, and hemorrhages due to thrombocytopenia; pallor and fatigue from anemia; and infections due to neutropenia. More than 90% of patients with FA develop pancytopenia caused by aplastic anemia, which is often fatal. (www.emedicine.com/ped/topic3022.htm)

- Causes of Budd-Chiari syndrome are as follows:
- *Hematological disorders*- Polycythemia rubra vera; Paroxysmal nocturnal hemoglobinuria;
- *Unspecified myeloproliferative disorder*- Antiphospholipid antibody syndrome; Essential thrombocytosis; *Inherited thrombotic diathesis*- Protein C deficiency; Protein S deficiency; Antithrombin III deficiency; Factor V Leiden deficiency;
- *Pregnancy and postpartum* - Membranous webs ; Oral contraceptives ;
- *Chronic infections*- Hydatid cysts ; Aspergillosis ; Amebic abscess ; Syphilis ; Tuberculosis;
- *Chronic inflammatory diseases*- Behçet disease ; Inflammatory bowel disease ; Sarcoidosis ; Systemic lupus erythematosus ; Sjögren syndrome ; Mixed connective-tissue disease;
- *Tumors*- Hepatocellular carcinoma ; Renal cell carcinoma ; Leiomyosarcoma ; Adrenal carcinoma ; Wilms tumor ; *Miscellaneous*- Right atrial myxoma; Alpha1-antitrypsin deficiency ; Trauma ; Dacarbazine ; Urethane

Which is least likely to cause hypervascular liver mets

- A) Pheochromocytoma
- B) Bronchogenic CA
- C) Carcinoid
- D) Islet cell tumor
- E) Thyroid ca

Which is least likely to cause hypervascular liver mets

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Bronchogenic CA

- Hypervascular metastases include carcinoids; leiomyosarcomas; neuroendocrine tumors; renal carcinomas; thyroid carcinomas; choriocarcinomas. Occasionally cancers of the pancreas, ovary, or breast can produce hypervascular metastases. Metastases containing multiple tortuous vessels tend to be hypervascular; their echogenicity is most probably related to the number of blood-tissue interfaces rather than the blood vessel walls themselves. Metastases from the following tumors tend to be echogenic: GI cancer, renal cell carcinoma, carcinoid, choriocarcinoma, pancreatic islet cell tumors, chloromas (leukemic), and AIDS-related Kaposi sarcoma. In children, metastases from neuroblastoma, hepatoblastoma, leukemia, hepatoma, and Wilms tumor may be densely echogenic. Tumors responding to therapy may show increased echogenicity, but more often, they show a reduction in size.
- Hypoechoic metastases are generally hypovascular and comprise uniform tissue and/or cellularity. Any primary tumor can cause this pattern of metastases, but those particularly likely to have this pattern are lymphoma; melanoma; and carcinoma of the pancreas, lung, or cervix.

- Two groups of patients tend to get cystic metastases: (1) patients who have a primary neoplasm with a cystic component, such as a mucinous cystadenocarcinoma of the colon, stomach, pancreas, or ovary, and (2) patients with metastases that are undergoing central necrosis, when low-level echoes and wall irregularity is seen. Squamous cell carcinoma, leiomyosarcoma, melanoma, and testicular carcinoma have a propensity to undergo extensive central necrosis.
- Causes of calcified liver metastases include ovarian serous lesion; mucinous adenocarcinoma of the stomach, pancreas, colon, and rectum; cystadenocarcinoma ; neuroblastoma; leiomyosarcoma (usually of the stomach) ; carcinoid; endocrine pancreatic carcinoma; medullary carcinoma of the thyroid; melanoma; osteogenic sarcoma; treated breast cancer; bronchogenic carcinoma; pleural mesothelioma; renal cell carcinoma; testicular carcinoma; lymphoma; chondrosarcoma; and ovarian teratocarcinoma.

Which is a characteristic of the MELD (model end-stage liver disease) scoring system

- A) Serum albumin
- B) Hepatic encephalopathy
- C) ALT
- D) Ascites
- E) Serum creatinine

Which is a characteristic of the MELD (model end-stage liver disease) scoring system

- A) Serum albumin
- B) Hepatic encephalopathy
- C) ALT
- D) Ascites
- **E) Serum creatinine- it is calculated with INR, Bilirubin and Cr**

Creatinine

- Model for End-Stage Liver Disease (MELD) score predicts liver disease severity based on serum creatinine, serum total bilirubin, and INR and has been shown to be useful in predicting mortality in patients with compensated and decompensated cirrhosis.
- Liver transplant candidates under the age of 12 are assigned a PELD (Pediatric End-Stage Liver Disease) score. The PELD score is based on bilirubin, INR, albumin, growth failure, and age when listed for transplant, factors which better predict mortality in children.

MELD

- **Calculated with**
  - **INR**
  - **Bilirubin**
  - **Cr**
- **3.8 x log (e) (bilirubin mg/dL) + 11.2 x log (e) (INR) + 9.6 log (e) (creatinine mg/dL)**
- Scores range from 6-40. A score of six indicates the least ill patient and a score of forty indicates the sickest patient.

- Most likely cause of pneumoperitoneum in a patient who has not had abdominal surgery.
  - A) Appendicitis
  - B) Diverticulitis
  - C) Colon cancer
  - D) Ischemic bowel
  - E) Duodenal ulcer

Duodenal Ulcer

- The most common cause of a spontaneous pneumoperitoneum is the introduction of air through the female genital tract. A perforated appendix seldom causes a pneumoperitoneum.
- The causes of a pneumoperitoneum are as follows:
- Ruptured hollow viscus - Perforated peptic ulcer, ruptured or perforated Meckel sigmoid and jejunal diverticula, necrotizing enterocolitis, toxic megacolon, inflammatory bowel disease, and idiopathic gastric perforation in premature infants
- Infection of the peritoneal cavity with gas-forming organisms and/or rupture of an adjacent abscess
- Iatrogenic factors - Recent abdominal surgery, abdominal trauma, leaking surgical anastomosis, misplaced thoracentesis or pleural drainage tube, endoscopic perforation, injury due to the tip of an enema catheter, percutaneous needle biopsy, peritoneal catheter placement, peritoneal dialysis, paracentesis, diagnostic or therapeutic pneumoperitoneum, instrumental perforation of uterus or vagina, culdocentesis, ruptured urinary bladder, Rubin test for tubal patency, pelvic examination, intercourse, orogenital insufflation, douching, knee-to-chest movements in females (as during water skiing, horseback riding, and squatting), perforating foreign body, and application of compressed air directed towards the anus and overdistension of the stomach with gas during gastroscopy
- Bowel obstruction due to a neoplasm, imperforate anus, Hirschsprung disease, or meconium ileus (when gas may permeate through the bowel wall)
- Pneumatosis intestinalis
- Chemoembolization of liver tumors
- Extension from the chest: pneumomediastinum and bronchopleural fistula
- Perforated peptic ulcer and Meckel diverticulum - Most common causes in older children
- Necrotizing enterocolitis and spontaneous perforation of the stomach - First and second most common causes of organ perforation in the newborn and infants, respectively

- Hypoperfusion complex. Which is not true?
- a. non-enhancement of bowel wall.

Hypoperfusion complex

- In shock, hypoperfusion findings include fluid-filled dilated bowel; intense enhancement of the adrenal glands, pancreas, bowel wall, mesentery, kidneys, aorta and IVC; and small caliber of aorta and IVC.
- *Intense Contrast Enhancement of the Adrenal Glands: Another Abdominal CT Finding in the Hypoperfusion Complex In Children; AJR*

Hypoperfusion complex. Which is not true?

- Acute bowel ischemia may be caused by occlusions of the arteries or veins, as well as by nonocclusive reduction of intestinal perfusion. Acute occlusions of the superior mesenteric artery due to thrombosis or embolization are responsible for approximately 60%–70% of cases of acute bowel ischemia, whereas mesenteric venous thromboses account for 5%–10% of the total and nonocclusive conditions (intestinal overdistention, inflammatory conditions, trauma, familial dysautonomy syndrome, radiation, corrosive injury, immunosuppression, chemotherapy, a variety of pharmaceutical agents, hypotension, cocaine, crack cocaine, and heroin).
- CT findings in acute bowel ischemia may consist of various morphologic changes, including homogeneous or heterogeneous hypoattenuating or hyperattenuating wall thickening, dilatation, abnormal or absent wall enhancement, mesenteric stranding, vascular engorgement, ascites, pneumatosis, and portal venous gas.
- hypoattenuation of a thickened bowel wall, representing bowel wall edema, is more typical in cases of acute bowel ischemia caused by mesenteric venous occlusion.
- intramural hemorrhage and hemorrhagic infarction may occasionally cause hyperattenuation of the thickened bowel wall
- normal bowel wall thickness range from 3 to 5mm
- luminal dilatation and/or air-fluid levels are quite common CT findings in acute bowel infarction (56%–91% of cases)
- absence of bowel wall enhancement has been reported to be highly specific for acute mesenteric ischemia (specificity, 96%
- mesenteric fat stranding, mesenteric fluid, and/or ascites are also nonspecific CT findings in acute bowel ischemia, and their presence depends heavily on the cause, pathogenesis, and severity of the ischemia
- pneumatosis and portomesenteric venous gas have been reported as less common but more specific findings of acute bowel ischemia
- There are three major potential pitfalls regarding CT detection of bowel ischemia:
- A colonic segment with superficial mucosal ischemic injury may react with spasticity, and CT findings may be misinterpreted as a simple contraction (providing there is no pericolic fat stranding, abnormal attenuation, or enhancement). Luminal distention by means of oral or rectal contrast material or water may be helpful in such cases.
- Presence of a widely distended colonic segment where, for example, a bowel wall thickness of 3–5 mm (which would be normal for a colonic segment with a lesser degree of distention) should nonetheless be interpreted by the radiologist as thickened.
- Most important pitfall, is a tendency to misinterpret bowel wall dilatation and air-fluid levels as ileus or pseudo-obstruction in patients with acute arterio-occlusive small-bowel infarction account for approximately 20%–30% of cases.

- Radiation to the abdomen causes what complication in kids but not adults
- a) sarcoma
- b) scoliosis
- c) cartilage destruction

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- **b) scoliosis**
- c) cartilage destruction

scoliosis

- Scoliosis occurs concave to the side of irradiation secondary to asymmetric vertebral growth and muscular fibrosis. (Dahnert p.147)
- In general, scoliosis induced by radiotherapy is thought to be mild and non progressive. It affects the growing spine more severely than mature spine. Changes can occur with doses of 10 Gy and higher and generally occur 9 to 12 months after treatment.
- The epiphysis is the most sensitive area to radiation and it has been shown that delivery of a total of 20 Gy to immature bone can cause growth disturbance. Radiotherapy can also increase the risk for epiphyseal plate trauma such as slipped capital femoral epiphysis. Radiation delivered to the metaphysis can cause bowing, fraying and sclerosis and look similar to rickets.
  - University of Washington, UWMC Roosevelt Clinic, Musculoskeletal Radiology



- *Hypoplastic pelvis and lumbar scoliosis in a patient who received radiotherapy as a child.*

- What is not associated with VHL? (Recall)
  - A) Pancreatic cysts
  - B) Pancreatic adenocarcinoma/ islet cell tumors
  - C) Renal cancer
  - D) angiomyolipoma
  - E) pheochromocytoma

angiomyolipoma

- Danhert: VHL= RETINOCEREBELLAR ANGIOMATOSIS= inherited neurocutaneous dysplasia; AD (gene located on chromosome 3p25-p26)
- VHL is characterized by a predisposition to bilateral and multicentric retinal angiomas, central nervous system (CNS) hemangioblastomas; renal cell carcinomas; pheochromocytomas; islet cell tumors of the pancreas; endolymphatic sac tumors; and renal, pancreatic, and epididymal cysts. CNS hemangioblastoma (Lindau tumor) is the most commonly recognized manifestation of VHL and occurs in 40% of patients.1 emedicine

- Most likely pancreatic lesion in VHL
  - A) Pancreatic cyst
  - B) Islet cell tumor
  - C) Mucinous cystadenoma
  - D) Microcystic adenoma
  - E) Mets
  - F) Adeno CA

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Pancreatic cyst

- VHL: renal cysts and carcinomas, pancreatic cysts, spinal and cerebellat hemangioblastomas, retinal angiomas, pheochromosytomas, papillary cystadenomas of the seminal epididymis.
- **Answer: A .** Approximately 72 % of the people with Von Hippel Lindau have simple pancreatic cysts. Also associated, but less commonly, are ductal cell adenoma, ampullary carcinoma, hemangioblastoma, microcystic adenoma, and nonfunctional islet cell tumor.
- Source: Gore, Textbook of GI Radiology.

- Which is most likely indication for doing arterial and portal venous phase imaging
  - A) HCC
  - B) Lymphoma
  - C) Lung met
  - D) Colon cancer met
  - E) Hemangioma
  - F) Adenoma

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HCC

- Answer A. In cirrhotic livers, HCC are best detected by helical CT or dynamic contrast enhanced MRI during arterial phase. HCC shows early arterial enhancement. Primer, page 215)

- What would not show posterior acoustic enhancement in liver? (Recall)
- a. HCC
- b. Mets
- c Hemangioma
- d. Focal fatty infiltration
- e. Adenoma

- What would not show posterior acoustic enhancement in liver? (Recall)
- a. HCC
- b. Mets
- c Hemangioma
- **d. Focal fatty infiltration**
- e. Adenoma

D – Focal Fatty Infiltration

- Fatty change causes posterior shadowing. At US, the typical findings of HCC are mosaic pattern, peripheral sonolucency, lateral shadow due to fibrotic pseudocapsule, and posterior acoustic enhancement (JVIR). According to Taboury et al, more than 75% of hemangiomas also have posterior acoustic enhancement that is correlated with hypervascularity at angiography. (emedicine)Adenomas can be cystic with hemorrhage and have posterior enhancement.

- What is true about islet cell tumor?
- a. Most common is glucagonoma
- b. Nonfunctioning islet cell tumors are benign
- c. No association with VHL
- d. All of the above are wrong

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- **d. All of the above are wrong**

All wrong

- All wrong- Insulinoma most common, nonfunctioning are >80% malignant, they are associated with VHL

- What is most likely to be hypodense in the pancreas?
- a. Adenocarcinoma
- b. Microcystic cystadenoma
- c. Islet cell tumor
- d. Two other choices

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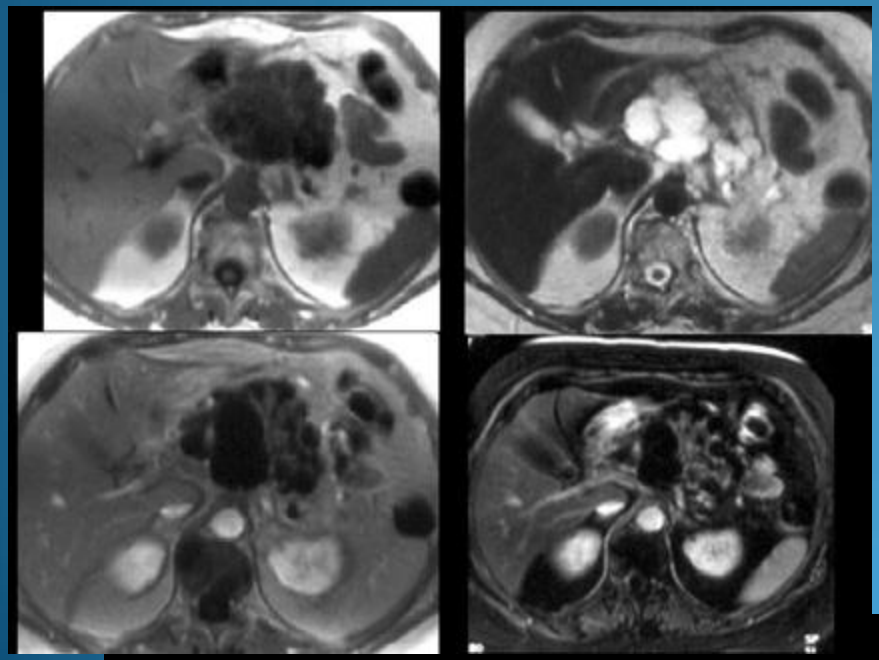


Adenocarcinoma

- Probably more to the question, as adenoca and microcystic cysteadenoma can be hypodense
- A: Adenocarcinoma: The normal pancreas has an attenuation value of 30-50 HU. A central zone of decreased attenuation occurs in 83% of patients. The margins of the low-attenuating mass usually are poorly defined and correspond to a hypovascular scirrhous tumor. Pancreatic tumor also may undergo central necrosis to produce a low density, and the tumor then simulates a small pseudocyst. (emed) microcystic cystadenoma: Classically, these lesions have a mean diameter of 5-8 cm (range, 2-20 cm) and a lobulated external contour. They are composed of a grapelike cluster or honeycomb pattern of 6 or more uniformly sized cysts that are 2 cm or smaller. They tend to occur in the head or neck of the gland, although biliary obstruction is present in only about 15% of the cases.
- In about 30% of the cases, a central, stellate, late-enhancing scar is present with calcification. Small septae and internal debris may be seen in individual cysts. Because the capsule of these tumors is poorly developed, poor distinction of the tumor from the surrounding pancreatic parenchyma is often observed. No communication occurs with the pancreatic duct, except in rare cases (see Images 1-2). The tumor is generally has attenuation similar to that of water on nonenhanced scans, and it typically enhances with contrast in a Swiss cheese–like pattern. Some tumors have a few cysts larger than 2 cm.







- Serous cystadenoma on a contrast-enhanced CT scan. Note the Swiss cheese–like enhancement and gentle external lobulation.
- MRIs of serous cystadenoma. Top left, T1-weighted image; top right, T2-weighted image; bottom left, T1-weighted gadolinium-enhanced image; bottom right, fat-suppressed T1-weighted gadolinium-enhanced image. The mass is externally lobulated and hypointense on the T1-weighted image and hyperintense on the T2-weighted image, with septal enhancement and, atypically, some larger cysts.

- Where is most common place for posttransplant lymphoprolifereative disease to impact the gastrointestinal system?
- a. Esophagus
- b. Stomach
- c. Colon
- d. Small bowel
- e. Pharynx

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- a. Esophagus
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- c. Colon
- **d. Small bowel**
- e. Pharynx

D: Small Bowel

- Most patients with PTLDs have extranodal involvement, with the GI tract being the principal site of clinical presentation. Overall, the GI tract is involved in about 35% of PTLD cases, with the small bowel being the most common site.(pathmax.com)
- The most common sites for involvement are lymph nodes (59%), liver (31%), lung (29%), kidney (25%), bone marrow (25%), small intestine (22%), spleen (21%), CNS (19%), large bowel (14%), tonsils (10%), and salivary glands (4%). *emedicine*

- What is true about infection of cecum (implied typhlitis)?
- a. Found in Immunosuppresed state
- b. Pseudomembranous colitis can mimic this
  - Recall answers not remembered well but answer was immunosuppressed state

Typhilitis

- Typhlitis means inflammation of the cecum. ... inflammation and/or necrosis of the cecum, appendix, and/or ileum in patients with leukemia. Typhlitis subsequently has been associated with aplastic anemia, lymphoma, AIDS, and immunosuppression following renal transplantation or during treatment of malignancy. Typhlitis is usually confined to the cecum, appendix, and terminal ileum; however, it can cause a pancolitis extending distally from the cecum.Infectious colitis is in the differential. (emed)

- How is NEC most likely to present? (Recall)
- a. Dilated bowel
- b. Pneumatosis
- c. Free air
- d. Portal venous air

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- **a. Dilated bowel**
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- c. Free air
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NEC

- Abdominal radiographs may demonstrate multiple dilated loops of bowel that change little in their location and appearance with sequential studies. Pneumatosis intestinalis, or gas in the wall of bowel in a linear or bubbly pattern, is present in 50-75% of patients. Portal venous gas and gallbladder gas indicate serious disease. Pneumoperitoneum indicates a perforation. CT or water-soluble enema examination may be used to demonstrate pneumatosis or a site of perforation.
- Characteristic findings on an AP abdominal radiograph include an abnormal gas pattern, dilated loops, and thickened bowel walls (suggesting edema/inflammation). (emed)

- How would endometriosis to the bowel look like on barium small bowel series?
- a. Melanoma mets
- b. Intraperitoneal mets
- c. Lipoma
- d. GIST

- How would endometriosis to the bowel look like on barium small bowel series?
- a. Melanoma mets
- **b. Intraperitoneal mets**
- c. Lipoma
- d. GIST

- When endometriosis invades the bowel wall deeply, it causes a lot of scarring and retraction and can form a tumor which partially obstructs the bowel wall. When disease is very superficial, it usually causes no symptoms at all. There is a long continuum of disease severity from very superficial to very bulky and invasive, and some patients can have both superficial disease in one area of the bowel, and bulky invasive disease in another.
  The location of GI endometriosis follows well-defined patterns. The lower rectosigmoid colon is most commonly involved, followed by the last part of the ileum (the small intestine), the cecum (the first part of the large bowel), and the appendix (which hangs off of the cecum). Thirty percent of patients have more than one GI area involved. Superficial disease in any of these areas usually causes no symptoms, but bulky, deeply invasive disease can cause real problems. Enteric lesions of endometriosis are generally serosal, usually eccentric and typically multiple. Involvement of the mucosa is uncommon. Thus, though endometrial deposits of the small bowel may lead to obstruction, bleeding is uncommon[When ileal endometriosis manifests as extrinsic mass effect and tethering, intraperitoneally seeded metastasis to the ileum should be a leading consideration in the differential diagnosis (17). When endometriotic implants in the small bowel manifest as true annular lesions in the ileum, the differential diagnosis includes various malignant tumors. Primary carcinomas of the small bowel may also appear as annular lesions, but these tumors are usually associated with mucosal destruction and shelflike, overhanging borders and are more commonly located in the proximal part of the small bowel (17). In contrast, annular metastases usually cause marked luminal narrowing and angulation, are often accompanied by high-grade obstruction, and are not confined to the distal ileum (19). Lymphomas and carcinoid tumors that circumferentially encase the small bowel could conceivably produce similar findings (17), but the correct diagnosis may be suggested on the basis of the clinical history and presentation.(radiology.org)

- What is not diagnosed by Octreotide? (Recall)
  - A) Pituitary adenoma
  - B) Small cell cancer
  - C) Adenocarcinoma of lung
  - D) Pheochromocytoma
  - E) Islet cell tumor

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Octreatide Scan

- Somatostatin is a natural neuropolypeptide (cyclic 14 aa with T1/2 of few min) which usually has inhibitory action. Neuroendocrine cells often have somatostatin receptors.
- Somatostatin receptors are found in many tumors including
  - pituitary adenomas,
  - islet cell tumors,
  - neuroblastoma,
  - pheochromocytoma,
  - small cell carcinoma of the lung,
  - paragangliomas,
  - carcinoid,
  - medullary carcinoma of the thyroid,
  - meningiomas,
  - astrocytomas,
  - lymphoma,
  - merkel cell tumors, and
  - breast cancer.
    - Brighamrad.harvard.edu

- What is true about GI carcinoid?
  - A) Often presents early
  - B) When symptomatic, distal mets are NOT found
  - C) Carcinoid of appendix is benign
  - D) Two other choices

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Carcinoid

- Carcinoid is the most common small bowel tumor and usually occurs in the TI. However, this tumor tends to be small and submucosal, not freely mobile as mentioned in the root.
- Dahnert p.802
- Carcinoid Syndrome: ↑ SE levels
- most common w/ ileal carcinoids—hepatic mets (bypass SE bkdn metabolic pthwy)
- 1° pulmonary, ovarian carcinoids => produce Sx
- Dahnert p.801

Budd Chiari is not associated with

- A) PNH
- B) Chronic viral hepatitis
- C) Behcet's
- D) Polycythemia vera
- E) Myeloproliferative disease

Budd Chiari is not associated with

- A) PNH
- B) Chronic viral hepatitis
- C) Behcet's
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- E) Myeloproliferative disease

[redacted]

?

- B. chronic viral hepatitis
- Associations: Idiopathic, hypercoagulable states, polycythemia vera, paroxysmal nocturnal hemoglobinuria (PNH), myeloproliferative d/o, OCP, neoplasms, trauma,
- pregnancy, bone marrow transplant, drugs
- *SFH: Another question listed fanconi anemia as the answer. I guess this is the best answer on this question*

[redacted]

- **Causes:** Most patients have an underlying thrombotic diathesis. In approximately a third of patients, an underlying cause is not evident. Causes of Budd-Chiari syndrome are as follows:
- Hematological disorders
  - **Polycythemia rubra vera**
  - **Paroxysmal nocturnal hemoglobinuria**
  - **Unspecified myeloproliferative disorder**
  - Antiphospholipid antibody syndrome
  - Essential thrombocytosis
- Inherited thrombotic diathesis
  - Protein C deficiency
  - Protein S deficiency
  - Antithrombin III deficiency
  - Factor V Leiden deficiency
- Pregnancy and postpartum
- Membranous webs
- Oral contraceptives
- Chronic infections
  - Hydatid cysts
  - Aspergillosis
  - Amebic abscess
  - Syphilis
  - Tuberculosis
- Chronic inflammatory diseases
  - **Behçet disease**
  - Inflammatory bowel disease
  - Sarcoidosis
  - Systemic lupus erythematosus
  - Sjögren syndrome
  - Mixed connective-tissue disease
- Tumors
  - Hepatocellular carcinoma
  - Renal cell carcinoma
  - Leiomyosarcoma
  - Adrenal carcinoma
  - Wilms tumor
  - Right atrial myxoma
- Miscellaneous
  - Alpha1-antitrypsin deficiency
  - Trauma
  - Dacarbazine
  - Urethane
- Idiopathic emedicine

- Child develops pancreatic enlargement and a 3 cm cystic lesion in the pancreas, which is most likely reason?
  - CF
  - Chronic pancreatitis
  - Child abuse

- Child develops pancreatic enlargement and a 3 cm cystic lesion in the pancreas, which is most likely reason?
  - CF
  - Chronic pancreatitis
  - **Child abuse**

Answer: Child abuse

- Blows to the anterior abdomen may compress the pancreas against the vertebral column, contusing it and leading to traumatic pancreatitis. Occasionally this will lead to the development of a traumatic pancreatic pseudocyst. Non-specific abdominal complaints may lead to the diagnosis of these conditions weeks or months after the original injury.
- Blunt trauma to the abdomen is the main cause of pancreatic injury in **child**hood. One of the most common causes of injury is **child abuse**. Pancreatitis, pancreatic pseudocyst, and loculated peripancreatic effusion are sequellae of this trauma. *Radiology* ***Sonography in the diagnosis and management of pancreatic pseudocysts and effusions in childhood***

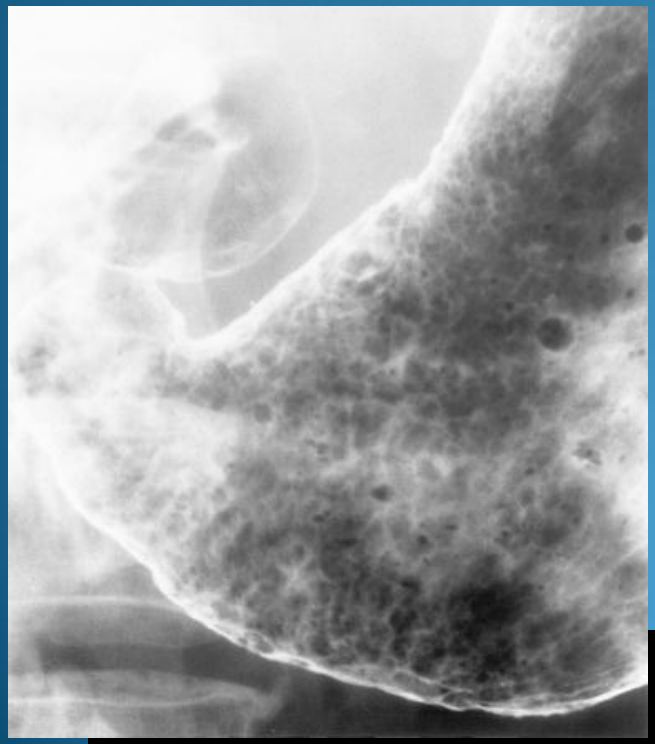
- Additional information good to know:
- High Specificity
- Classic metaphyseal lesions
  Rib fractures, especially posterior
  Scapular fractures
  Spinous process fractures
  Sternal fractures

- MALT lymphoma is associated with (Repeat)
  - A) H. Pylori
  - B) Giardia
  - C) Gastric carcinoma

- MALT lymphoma is associated with (Repeat)
  - **A) H. Pylori**
  - B) Giardia
  - C) Gastric carcinoma

Answer: H. pylori

- *www.emedicine.com/med/topic 3204*
- MALT is lymphoid tissue scattered along mucosal linings of the body. It protects against antigens entering along mucosal surfaces. MALT is one of the major secondary lymphoid organs, along with nodes and spleen. Tonsils, Peyer's patches and appendix are examples of MALT.
- H. pylori is the main cause of gastritis, responsible for up to 80% of gastric and 95% of duodenal ulcers, and is implicated in the pathogenesis of gastric adenocarcinoma and MALT lymphoma. MALT is associated with H. pylori gastritis in 90% (may regress completely after antibiotic therapy).



MALT lymphoma has variable UGI examination findings, the most common of which is shallow or deep ulcers. The lesions in high-grade MALT lymphoma tend to be more aggressive than those in low-grade MALT lymphoma. Differentiation of gastric MALT lymphoma from gastritis or gastric carcinoma is *extremely difficult*, especially in cases of low-grade lymphoma.

- Which structure does not contact the caudate lobe (Repeat)
  - A) Ligamentum teres
  - B) IVC
  - C) falciform ligament
  - D) left lobe of liver
  - E) right lobe of liver

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What is the most common cause of a small bowel mass localized in the ileum of an adult?

a) adenocarcinoma

b) carcinoid

c) lymphoma

d) Crohn's (don't remember for sure if this was one of the choices or not)

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B. Carcinoid

- Carcinoid comprises 25-41% of malignant small bowel masses. Dahnert states SB carcinoids are "predominantly" (80-90% according to some sources) in the distal ileum. AdenoCA comprises 25% of malignant SB masses (48% in duodenum, 44% jejunum, 8% ileum). Lymphoma comprises 17% of malignant SB masses. While Crohn dz commonly affects TI, more likely to be stricture or asymmetric transmural involvement than "mass".
  - (source: Dahnert p637, 4th Ed)

- *AJR*

THE ROENTGENOLOGIC SPECTRUM OF SMALL INTESTINAL CARCINOID TUMORS

CARCINOID tumors are the most common primary neoplasms of the small intestine. Frequently, carcinoid tumors are

The primary neoplasm arose in the ileum in 17 cases and in the jejunum in 1 case.

- A 30 year old man undergoes small-bowel follow-through which demonstrates a pedunculated mass in the terminal ileum. The most likely diagnosis is:

  a Adenoma

  b Inflammatory fibroid of the small bowel

  c Lymphoma

  d Carcinoid

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  c Lymphoma

  d Carcinoid

Adenoma

- *Radiographics*
- ***Multi–Detector Row CT: Spectrum of Diseases Involving the Ileocecal Area***

Other Benign Tumors.—Adenomas most commonly occur in the ileocecal region and may manifest as pedunculated or broad-based intraluminal masses with soft-tissue attenuation. He-

- ***Adenomas*** – Proliferating epithelial neoplasms, 40% villous, rest tubular or tubulovillous; small (1 to 3 cm), smooth or slightly lobulated. On barium sessile or pedunculated intraluminal defects. Usually solitary but may be multiple in with polyposis syndromes. Adenomas are the commonest tumors of small bowel and account for 25% benign small intestinal tumors (Robbins Pathology Pg. 827) However according to Gore & Levine, AFIP and Dahnert – leiomyomas (now classifed as GIST) are the most common benign small bowel tumors and have a high predilection for jejunum. Most adenomas occur in 2nd duodenum. Malignant changes are likely with large, villous adenomas. ***Inflammatory fibroid polyps*** – uncommon and are encountered in elderly patients and occur almost always in the ileum. Usually solitary and composed to fibrous stroma with diffuse inflammatory infiltrate. Barium shows smooth, rounded mass in distal small bowel. ***Lymphoma*** – Primary or secondary NHL; secondary GI involvement in 50% patients (stomach > small bowel > colon). Patterns on radiology (i) multiple nodular defects, (ii) infiltrating form, (iii) polypoid form, (iv) endoexoteric form with excavation and fistula formation and (v) predominately mesenteric invasive from with extraluminal mass. ***Carcinoids*** – malignant neoplasms in slow motion, appendix commonest site followed by terminal ileum arise from the neural crest, invasion into mesentery incites an intense fibrotic reaction. **UGI** - small smooth submucosal mass (usually <2 cm, if >2 cm 85% chance of metastasis) impinging eccentrically on lumen, angulation + kinking of loops leading to obstruction is diagnostic; spiculated / tethered appearance of mucosal folds due to desmoplastic reaction. **CT** – calcification in mesenteric metastasis is 50%. [Ref. Gore & Levine]
- Inflammatory polyps are uncommon and seen in elderly patients. Pedunculated lesions are not common in carcinoid or lymphoma (lymphomatous polyposis is a rare form that includes lesions of follicular mantle cell origin). Hence adenoma is the most likely the correct answer – it is statistically the commonest of the above tumors and may be pedunculated; also is usually an incidental finding.

- A small-bowel follow through demonstrates linear ulcerations in the distal ileum on the mesenteric border with pseudosacculations on the antimesenteric border. The most likely diagnosis is:
  - A) Crohn disease
  - B) Regional enteritis
  - *C) Yersinia* enteritis
  - D) Tuberculosis

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Crohn's disease

- ***Crohn's disease (terminal ileitis; regional enteritis; granulomatous colitis)*** – (a) *Early disease* – submucosa and mucosa; smooth, symmetric small bowel fold thickening with thumbprinting; coarse villous pattern; and 1 – 3 mm mucosal ulcerations surrounded by halo of edema called aphthoid ulcers. (b) *Intermediate disease (non-stenotic)* – transmural but still limited to submucosa and muc; increasing thumbprinting with distorted and interruption of folds; increasing size and depth of aphthoid ulcers – stellate or rose-thorn appearance; ***long, linear ulcer on mesenteric border with thickening, sclerosis, and retraction of adjacent mesentery with straightening of the mesenteric border; antimesenteric border becomes pleated or sacculated;*** inflammatory polyps with normal diameter of bowel – colon > ileum called nodular pattern of CD. (c) *Advanced disease (stenotic)* – transmurally to serosa and beyond; deep linear cleft of ulceration or fissure; extensive ulceration with pseudopolyps – ulceronodular or cobblestone pattern (always associated with lumen reduction – string sign); linear mesenteric ulceration advances in caudad direction and antimesenteric sacculations disappear; fat wrapping (creeping fat) along mesenteric border with mesenteric perivascular fibrosis. *Crohn's carcinoma* – younger patients; distal ileum; areas of long-standing disease; surgically bypassed bowel more likely involved; at site of fistulas. ***Yersiniosis*** - gram-negative rod; epidemics by contaminated dairy products – fecal – oral transmission; may mimic appendicitis clinically; thickened mucosal folds with, nodules and aphthous ulcers in terminal ileum; lumen normal diameter and ulcerations are *superficial* (cf. Crohn's); cobblestone appearance due to enlarged lymphoid tissue (cf. Crohn's). ***Tuberculosis*** – 3 patterns on pathology – ulcerative (60%); hypertropic (10%) or ulcerohypertrophic (30%); transmural fibrosis, stensosis, and fistulas are common. Barium – nodular thickening of mucosa with distortion and effacement; ulcerated cecum with marked contraction; small bowel strictures; loss of ileocecal angle and widely patent ileocecal valve. [Ref. Gore & Levine]
- **(a) or (b)** are the correct answers i.e. Crohn's disease = regional enteritis

- -“The main action of gastrin is to:”
  - stimulate acid secretion in the stomach
  - stimulate polypeptide secretion in the stomach
  - stimulate polypeptide secretion from the pancreas
  - stimulate bicarbonate secretion from the pancreas
  - stimulate gallbladder contraction

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  - **stimulate acid secretion in the stomach**
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Gastrin

- Gastrin is a polypeptide which is secreted by the mucosal lining of the antral-pyloric region. Gastrin induces HCl secretion from the parietal cells. (source: any physiology text, Dahnert p646, 4th Ed.)

- gastrin (gas·trin) (gas¢trin) any of several polypeptide hormones released from peptidergic fibers in the vagus nerve. Forms include little gastrins (G17), with chain lengths of 17 amino acids, big gastrins (G34), and minigastrins (G14). Gastrin stimulates secretion of gastric acid (causing contraction of the lower esophageal sphincter and modifying gastric and esophageal motility), increases growth of acid-secreting mucosa cells, and weakly stimulates secretion of pancreatic enzymes and gallbladder contraction.
- In humans, gastrin is a hormone that stimulates secretion of gastric acid by the parietal cells of the stomach. Wikipedia

- “IPMT is characterized by which of the following:”
  - A) Unilocular cystic mass
  - B) Large multilocular (>6) cystic mass
  - C) Ductal calcifications
  - D) Ductal dilatation
  - E) Peri-pancreatic effusion

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IPMT

- The tumor produces an excessive amount of mucin and results in progressive dilation of the main pancreatic duct or cystic dilation of the branch ducts, depending on the location of the tumor
- The following findings are seen on imaging studies: lobulated multicystic dilatation of the branch ducts, diffuse dilatation of the main pancreatic duct, intraductal papillary tumors, elongated or globlike mucous plugs in the dilated ducts, and bulging of the papilla into the duodenal lumen.
- ***Radiologic Spectrum of Intraductal Papillary Mucinous Tumor of the Pancreas***
  - *Radiographics*

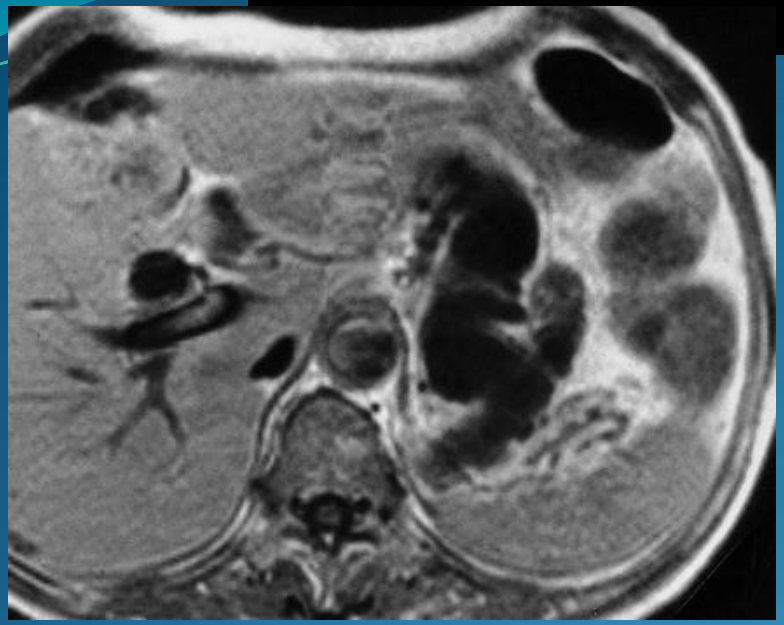


- Papillary intraductal cancer vs. mucinous cystic adenoma of the pancreas:
  - unilocular cyst
  - cysts larger than 6cm
  - diffuse ductal dilatation
  - ductal calcification

- Papillary intraductal cancer vs. mucinous cystic adenoma of the pancreas:
  - unilocular cyst
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  - **diffuse ductal dilatation**
  - ductal calcification

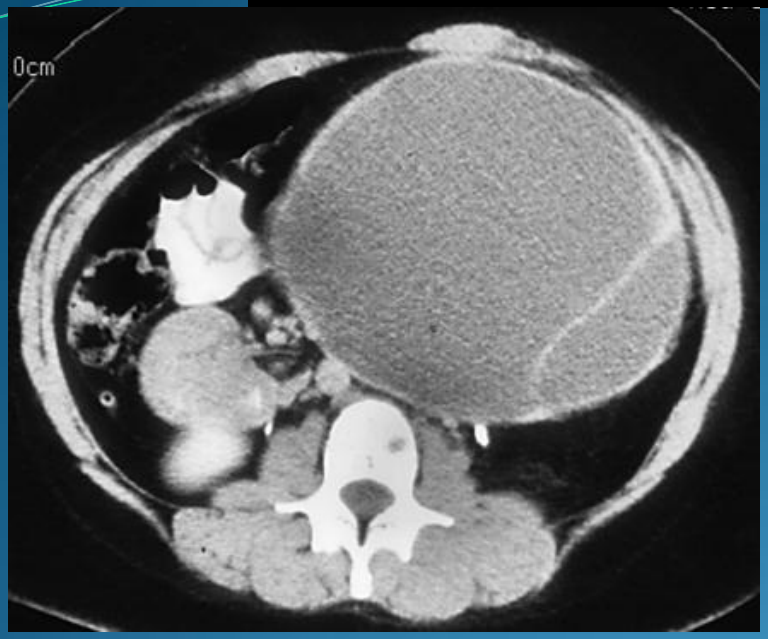
diffuse ductal dilatation

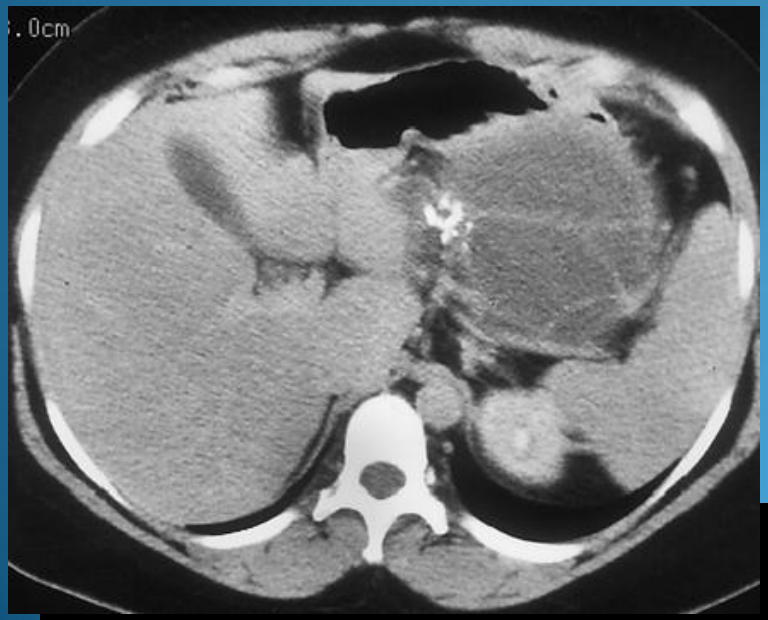
- Papillary intra ductal cancer is located within a dilated main or branch duct of the pancreas. They produce mucous which is seen extruding from the papilla on ERCP. The median age is in the 60s. Males are affected more often than females. They usually are seen as cystic areas in the head and uncinate process of the pancreas with varying degrees of dilatation of the pancreatic duct. Mucinous cystic adenoma can present as a unilocular cyst. Ductal calcification can be seen in both papillary intraductal cancer and in mucinous cystic adenoma I think the answer is C.
- Lee and Sagel, AFIP notes. Dr. Ferris





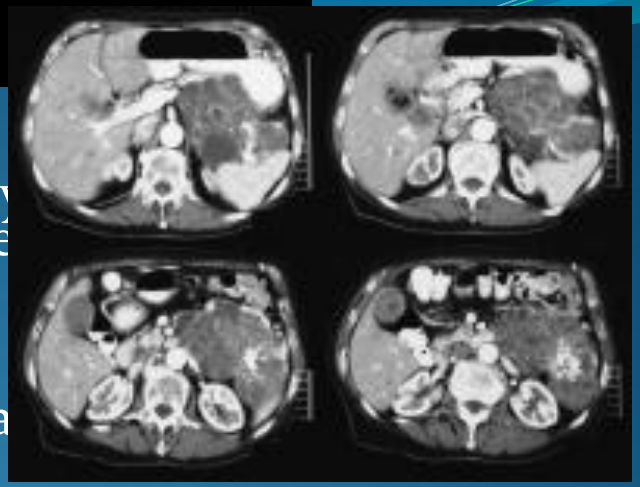
- Intraductal papillary mucinous adenoma
- T1
- MRCP
- images show marked dilatation of the main pancreatic duct



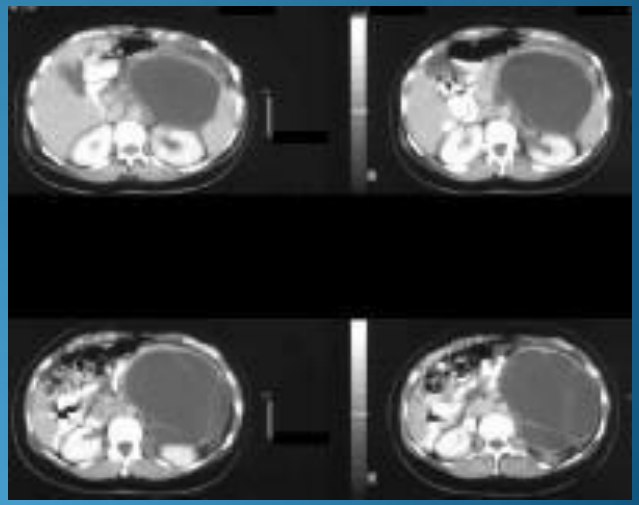


- Benign **cystic** neoplasms are of two types: micro**cystic**, also known as serous cyst**adenoma**, and macro**cystic**, also known as **mucinous cystic neoplasm**. These unusual proliferative pancreatic cysts have a slow growth rate and are frequently large when they are symptomatic. The less common malignant form, cystadenocarcinoma, has clinical features similar to those of the benign variants.
- CT scan shows a large cystic mass with evident septation in the left upper quadrant that displaces bowel loops. The mass is well circumscribed, and no signs of adjacent organ invasion can be seen. (**2**) CT scan of an upper portion of the mass shows its relationship to the remainder of the pancreas. Gross calcifications are noted within the cyst wall. Again, the cystic nature of the mass and the septations are clearly seen.
- ***Mucinous Cystic*** *Neoplasm of the Pancreas*
- *Radiographics*

- Characteristics of macrocystic vs. microcystic adenomas of the pancreas.
- Microcystic adenomas are also known as serous adenomas. 80% of patients are older than 60years old. Females are more frequently affected than males(3:2). The average diameter is 5cm. There is no malignant potential and they are equally distributed throughout the pancreas. They are characterized by small cysts(<1mm-2mm) and they may have a central scar which may or may not contain calcium. They do not typically obstruct ducts. They are hypervascular on angio. These are associated with Von Hippel Lindau disease.



- Macrocystic adenomas are seen predominantly in females(6:1). They are in a younger age group than microcystic adenomas(40-60years old). They are usually located in the body or tail of the pancreas. They have a larger mean diameter(10cm), often appear encapsulated, and are more often composed of multiple large cysts(typically greater than 2cm in size) rather than a unilocular cyst. They typically have thick walls and septa and may contain papillary excrescences.
- Lee and Sagel, AFIP notes.



- Which of the following primary or metastatic neoplasms is most likely to cause a linitis plastica stomach?

  a) lymphoma

  b) lung

  c) melanoma

  d) ovarian

  e) Breast

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Breast

- While Dahnert lists both lymphoma & breast mets as causes of linitis plasctica, Federle specifically lists 'linitis plastica' under lobular breast cancer mets. Additionally, he states that breast is the most common gastric met. Federle describes gastric lymphoma as 'diffuse, thickened irregular folds' rather than linitis plastica. Also, he describes leiomyosarcoma (or GIST) as a large, lobulated, submucosal mass +/- cavitation. Anecdotally, a form of this question is a repeat offender on multiple prior exams and has always been answered as 'breast' by others. (source: Dahnert p627, 4th Ed; Federle I:3:48)

- *Radiology*

tica appearance at barium studies. The most common cause of these findings is a primary scirrhous carcinoma of the stomach, which spreads predominantly in the submucosa and incites a marked desmoplastic response in the gastric wall (1–4). Less frequently, metastatic breast cancer or even Hodgkin disease can produce a similar appearance (5–9).

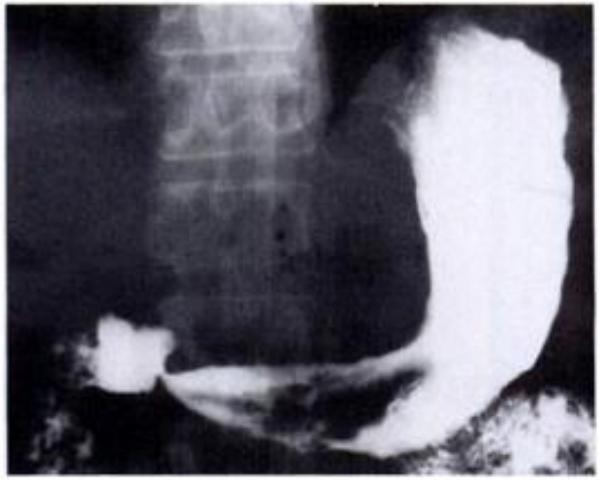
Non-Hodgkin Lymphoma of the Stomach: A Cause of Linitis Plastica[1]



1a.



1b.



2.

Figures 1, 2. **(1)** Non-Hodgkin lymphoma of the stomach with linitis plastica in a 57-year-old man. **(a)** Image from a single-contrast barium study shows marked narrowing of the gastric antrum. Also note irregular contour of the antrum and body. These findings are typical of linitis plastica. **(b)** CT scan without contrast material enhancement shows lobulated soft-tissue thickening of the wall of the gastric antrum and body due to a dense infiltrate of lymphomatous tissue. **(2)** Non-Hodgkin lymphoma of the stomach with linitis plastica in a 54-year-old man. Image from a single-contrast barium study shows diffuse narrowing of the stomach (most marked in antrum and body) due to lymphoma infiltrating the wall.

- **Most specific sign for Mesenteric ischemia:**
  - Target sign
  - Mesenteric venous gas
  - SMA occlusion
  - Ascites
  - Pneumoperitoneum

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Thrombus/occlusion in the superior mesenteric artery

- According to recent e-mail correspondence with Federle, the most sensitive sign of mesenteric ischemia is bowel wall thickening;

Table 1
Analysis of CT Findings

CT Finding	Study Group ($n = 39$)*	Control Group ($n = 24$)*	Sensitivity (%)†	Specificity (%)†	Accuracy (%)†
SMA thrombosis	7 (18)	0 (0)	18 (0.06, 0.30)	100	49 (0.37, 0.61)
SMV thrombosis	6 (15)	0 (0)	15 (0.04, 0.26)	100	48 (0.36, 0.60)
Intramural gas	11 (28)	1 (4)	28 (0.14, 0.42)	96 (0.88, 1.00)	54 (0.42, 0.66)
Portal venous gas	2 (5)	0 (0)	5 (0.00, 0.12)	100	41 (0.29, 0.53)
Bowel dilatation	26 (67)	17 (71)	67 (0.52, 0.82)	29 (0.11, 0.47)	52 (0.40, 0.64)
Bowel obstruction	4 (10)	16 (67)	10 (0.01, 0.19)	33 (0.14, 0.52)	19 (0.09, 0.29)
Bowel-wall thickening	15 (38)	8 (33)	38 (0.23, 0.53)	67 (0.48, 0.86)	49 (0.37, 0.61)
Extreme enhancement of thickened wall	13 (33)	7 (29)	33 (0.18, 0.48)	71 (0.53, 0.89)	48 (0.36, 0.60)
Lack of bowel-wall enhancement	7 (18)	1 (4)	18 (0.06, 0.30)	96 (0.88, 1.00)	48 (0.36, 0.60)
Mesenteric edema	27 (69)	15 (62)	69 (0.54, 0.84)	28 (0.10, 0.46)	57 (0.45, 0.69)
Ascites	19 (49)	7 (29)	49 (0.33, 0.65)	71 (0.53, 0.89)	57 (0.45, 0.69)
Ischemia of other organs	7 (18)	0 (0)	18 (0.06, 0.30)	100	49 (0.37, 0.61)
At least one specific sign	25 (64)	2 (8)	64 (0.49, 0.79)	92 (0.81, 1.00)	75 (0.64, 0.86)

* Numbers in parentheses are percentages.
† Numbers in parentheses are confidence intervals.

- **Which of the following does not produce hypervascular liver mets?**
  - carcinoid
  - islet cell tumor
  - thyroid cancer
  - lung cancer
  - melanoma

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  - carcinoid
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  - thyroid cancer
  - **lung cancer**
  - melanoma

lung cancer

- Bronchogenic lung mets are hypovascular.
- Hypervascular mets
  - Islet cell
  - Melanoma
  - Carcinoid
  - Renal cell cancer
  - thyroid
  - Breast
  - sarcoma

- -“A pancreatic abnormality is noted in a patient with Von Hippel-Lindau. This is most likely:
  - cyst
  - islet cell tumor
  - hemangioma
  - metastatic hypernephroma
  - microcystic adenoma

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Cyst

- Pancreatic cysts are seen radiographically in 30% of VHL patients & are reported to occur in up to 72% based on autopsy series. Federle places cysts first on the list of VHL pancreatic findings.
- Other pancreatic lesions are cystadenocarcinoma and islet cell tumor
- FYI, RCC is the leading cause of death in VHL patients. (source: Dahnert p276-7, 4th Ed; Federle III: 3: 20-2)

- All of the following are causes of retroperitoneal fibrosis except?

  a. retroperitoneal hemorrhage

  b. methysergide

  c. lymphoma

  d. xanthogranulomatous pyelonephritis

  e. abdominal aortic aneurysm

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xanthogranulomatous pyelonephritis

- The remaining choices are all listed as causes of RPF by Dahnert. Additonally, Federle does not mention RPF as a complication of XGP anywhere (complications are hepatic dysfunction, hemorrhage, fistulas). (source: Dahnert p805, 4th Ed; Federle III: 3: 36-8)
- The frequent association of retroperitoneal fibrosis with aortic aneurysm and the regression of fibrosis reported following aneurysm repair. *emedicine*

- Which syndrome has the highest risk of malignancy?

  a. granulomatous colitis

  b. Gardner's syndrome

  c. Barrett's esophagus

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Gardner's syndrome

- Gardner's syndrome carries a 100% malignant transformation (average age at death is 41). Patients should receive a prophylactic total colectomy by ~ age 20. (source: Dahnert p685, 4th Ed)

- Arterial *and* portal venous phase imaging should be performed to detect which lesion:

a. Hepatocellular carcinoma

b. Cholangiocarcinoma

c. Metastatic lesions

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Hepatocellular carcinoma

- According to Primer, HCC's demonstrate early arterial enhancement. But there is venous invasion in 50% so I think portal venous phase is important
- For metastases it says that most mets are hypovascular and they are best seen on portal venous phase images except for hypervascular lesions for which you would want arterial phase.
- But when you do CT body, we always get triple phase for HCC and regular Abd CT for mets. So I think HCC best answer. SFH

- -“Which part of the colon is least susceptible to ischemia?”

  a) hepatic flexure

  b) splenic flexure

  c) sigmoid

  d) rectum

  e) descending

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  e) descending

RECTUM

- All others are fair game in ischemia; the rectum is spared due to dual supply from IMA & internal iliacs. (source: Dahnert p696 4th Ed, VIR Requisites p289-91)
- Rectal ischemia is rare because of excellent collateral supply
  - *Ischemic proctosigmoiditis. America Journal of Gastroenterology*

- **A liver lesion is identify which is isointense to the spleen on T1 and T2; most likely etiology:**
  - FNH
  - Adenoma
  - Mets
  - Hepatoma
  - Hemangioma

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  - Adenoma
  - **Mets**
  - Hepatoma
  - Hemangioma

Metastases

- *Primer*; chart "Lesion Characterization by Modality," Metastases on MRI is the intensity of Spleen
  - Hemangioma – CSF intensity
  - FNH – Liver Intensity
  - Adenoma – Liver intensity
  - HCC – Liver intensity

- A small bowel hernia adjacent to the lateral rectus muscle is called a:
  - spigelian hernia
  - obturator hernia
  - femoral hernia
  - incisional hernia
  - lumbar hernia

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SPIGELIAN

- ANSWER: A. SPIGELIAN. (source: Federle I:1:32-3, Dahnert p690, 4th Ed) Occur along the lateral margin of the rectus muscle through the hiatus semilunaris.
- Paraduodenal hernias account for more than half of the reported internal hernias. Most occur on the left, through the fossa of Landzert and proceed into the descending mesocolon. One fourth develop on the right side of the abdomen through the fossa of Waldeyer and into the ascending mesocolon. Clinical presentation ranges from mild discomfort to symptoms of complete obstruction.
- On barium-enhanced radiographs, a mass of multiple barium-filled dilated small bowel loops may be detected in the left upper quadrant, lateral to the ascending duodenum, indenting the posterior gastric wall and distal transverse colon. These matted loops will be separate from the remaining small intestine. Computed tomography will additionally demonstrate the inferior mesenteric vein and ascending left colic artery to lie in the anteromedial border of a left paraduodenal hernia.
- Right paraduodenal hernias will appear as encapsulated small bowel loops, lateral and inferior to the descending duodenum on barium studies. Lateral films will demonstrate retroperitoneal displacement of hernia contents. The superior mesenteric artery and ileocolic branches are found in the anterior wall of a right paraduodenal hernia and may be visualized in this area on CT or angiography.

- Involves part, but not all of the bowel - richter
- Semilunar line (lateral margin of rectus sheath) - spigelian
- Congenital and diaphragmatic - bochdalek
- Associated with leg pain on hip flexion - obturator
- Inferior mesenteric vein - paraduodenal

- **Spigelian hernia**
- Richter hernia
- Obturator hernia
- Paraduodenal hernia

- Obturator hernia







Fig 3: Left para duodenal hernia: Axial CT section showing left Para duodenal hernia (horizontal arrow), Inferior mesenteric vein (vertical arrow) and engorged mesenteric vessels supplying affected loop (arrow head).

- **Regarding aphthous ulcers in Crohn's disease:**
  a. are usually specific for the disease
  b. usually painful
  c. irreversible
  d. bleed
  e. denote involvement of the circular muscle layer

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B. usually painful

- Aphthous ulcers are not specific - ddx is long - amebic colitis, TB, Behcets. (*Dähnert , p.766*)
- Aphthous ulcers are caused by mucosal edema and erosions over lymphoid follicles, and are the earliest radiographic sign of Crohns (*AFIP notes)*



- What is the most likely diagnosis in an asymptomatic 54 year old male with occult fecal blood and a large, mobile mass in the terminal ileum?
  - a. carcinoid
  - b. lymphoma
  - c. adenocarcinoma
  - d. peutz Jeugers

- **60 YEAR OLD WITH BRBPR. SB SERIES SHOWS FREELY MOBILE MASS.**
  - Lymphoma
  - Carcinoid
  - Small bowel adenocarcinoma
  - Other incorrect choices

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Adenoma, if not a choice then carcinoid

- SH- I think adenoma from a prior question is a good answer. The mass is freely mobile, pedunculated. The pt is bleeding so this may suggest an adenoma. Peutz Jeghers has adenomas.
- Carcinoid is very common in ileum but does not usually present as a freely mobile mass.
  - Radiographics

CT Evaluation of Small Bowel Neoplasms: Spectrum of Disease[1]

- **ANSWER: D. PEUTZ-JEUGERS**. PJS polyps are most common in jejunum/ileum and can be sessile or pedunculated. Associated with mucocutaneous pigmentation, but incomplete penetrance. Rather common presentation (>30%) present with melena. Polyps can grow to be large. Carcinoid is usually submucosal mass with mesenteric invasion. AdenoCA is usually a scirrhous apple-core or annular lesion. Lymphoma is usually marked luminal dilatation/infiltrating. (source: Dahnert p708-9 4th Ed, Federle I:4:56-60)

- A. Malignant small bowel tumors: Carcinoid 50%, adenocarcinoma 25%, lymphoma 15%, leiomyosarcoma 10%. (D481)
- **Lymphoma** of bowel may be primary (localized and diffuse), or secondary as part of a generalized systemic process; predominantly NHL, Hodgkin in 15%. 10% of people with abdominal lymphoma have bowel involvement. Median age is 60. Radiologic types: polypoid / nodular 47%, ulcerative 42% may be complicated by perforation, diffusely infiltrating 11% causes hoselike thickening of wall with decreased or absent peristalsis. Esophagus is the least common site (<1%). The stomach is 1-5% of all gastric malignancies. May have a circumscribed mass with endogastric / exogastric (25%) growth, large irregular ulcers, or broad tortuous mucosal folds (diffuse form). Lymphoma is 1/5 of all SB malignancies, and the most common *malignant* small bowel tumor. May look like Crohn's disease with ulceration, thickened valvulae, aneurysmal dilatation, polypoid masses, fistulae, and conglomerate mantle of retroperitoneal and mesenteric masses. The colon is less commonly involved than the SB or stomach, the cecum is the most common site involved (85% of LB). Usually is a single mass > diffuse infiltration > polypoid lesion. Massive regional, distal mesenteric, and retroperitoneal LAN. (D524)
- **Carcinoid** is the most common primary tumor of the small bowel and appendix; belongs to the APUDomas; M:F 2:1. Tumor releases ACTH, histamine, bradykinin, kallikrein, and seratonin. Carcinoid syndrome happens in 7% with excess seratonin, requiring that the liver is bypassed by metastasis (90% liver mets), primary pulmonary or ovarian carcinoids. Recurrent diarrhea in 70%, and asthmatic wheezing 15%. Rule if 1/3: 1/3 have metastasis, 1/3 are multiple, and 1/3 have another malignancy. (D498)
- Small bowel **adenocarcinoma** may arise in villous tumors or de novo. Location: duodenum 48%, jejunum 44%, ileum 8%. 60% have an annular stricture, 41% are lobulated / ovoid masses, and 27% ulcerate. (D481)

- **A 30yo female presents with diarrhea, a serum protein of 4.5ng/100dl, a small bowel follow through demonstrates dilated bowel, hypersecretion, variable thickened folds with an intussusception appearance.**
  a. Sprue
  b. Scleroderma
  c. Whipple's disease
  d. Gardner's
  e. Familial polyposis

- **A 30yo female presents with diarrhea, a serum protein of 4.5ng/100dl, a small bowel follow through demonstrates dilated bowel, hypersecretion, variable thickened folds with an intussusception appearance.**

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  b. Scleroderma

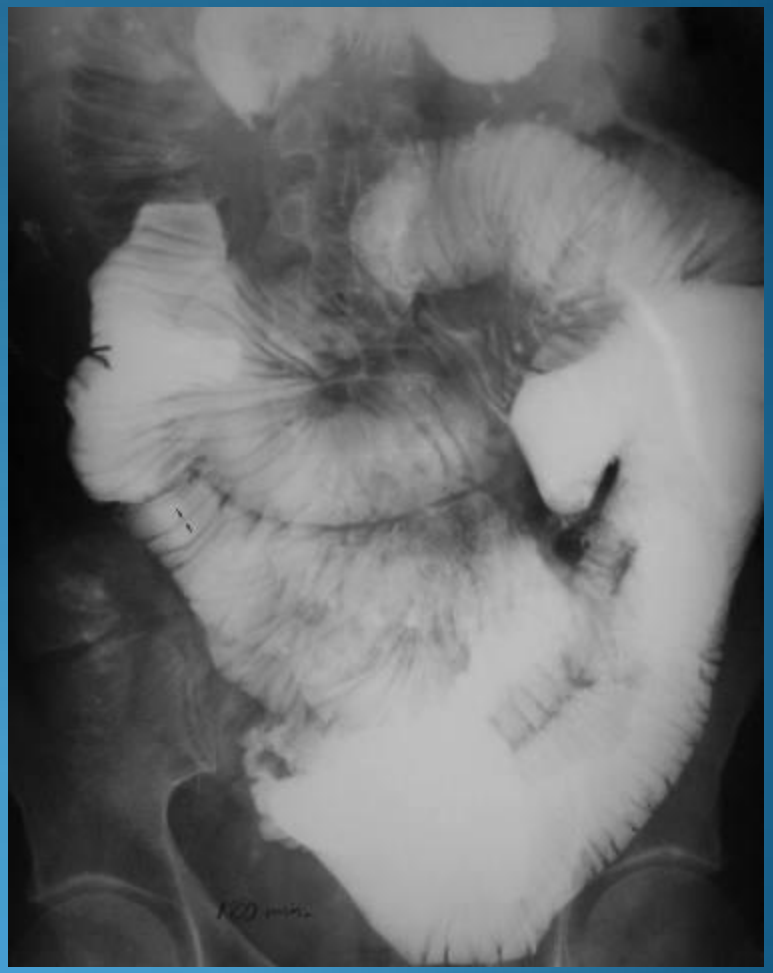
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Sprue

- In addition to above characteristics, other SBFT characteristics are "bubbly duodenum" (nodular), jejunization of ileum (increased # of folds), colonization of jejunum (loss of jejunal folds), "moulage sign" (cast like appearance due to absence of valvulae). (source: Federle I:4: 18-20, Dahnert p714-5, 4th Ed)
- Sprue is characterized by dilated small bowel loops, hypersecretion, and malabsorption. Transient intussusceptions are typical. The jejunal fold pattern is decreased (ilealization of the jejunum) and the ileal fold pattern becomes prominent (jejunization of the ileum).
- Whipple's disease is caused by Gram-positive rods. Irregularly thickened folds are present, most prominent in the jejunum, with tiny nodules spread throughout the mucosa.)



- All of the following may be seen in a patient who is status-post bone marrow transplant except?

  a. splenic abscess

  b. GVHD

  c. hepatic venoocclusive disease

  d. CMV pneumonia

  e. adrenal hemorrhage

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ADRENAL HEMORRHAGE

- Dahnert list multiple etiologies for adrenal hemorrhage, none of which is BMT. Additonally, under BMT complications, the other choices are listed (a-d) without mention of adrenal hemorrhage. (source: Dahnert p386, 557, 568, 759 4th Ed)
  - ***IMAGING IN BONE MARROW TRANSPLANTATION:*** **this article lists all the complications except adrenal hemorrhage**
  - ***Robert A. Clark, MD***
  - ***Radiology Service at H. Lee Moffitt Cancer Center & Research Institute, Tampa, Fla.***

- On a pre-liver transplant evaluation in a 34 year old female, the hepatic artery fills by collaterals from the GDA. She likely has

  a. median arcuate ligament compression.

  b. atherosclerosis of the celiac

  c. anatomic variant

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  c. anatomic variant

Median Arcuate ligament compression

- … Classic description of this entity due to compression of celiac by ligament. Common in asymptomatic young, thin females. Controversy as to whether causes variant of chronic mesenteric ischemia. (source: VIR Requisites p297, P Orons)





Median Arcuate ligament compression

- **Figure 7b.** **(a)** Sagittal 3D image of a patient with epigastric pain demonstrates acute angulation and narrowing of the proximal celiac axis. There is minimal poststenotic dilatation, which creates a "hooked" appearance (arrow) that is characteristic of median arcuate ligament syndrome. **(b)** Coronal oblique CT angiogram of the same patient reveals a prominent collateral vessel and dilatation of the gastroduodenal artery (arrowhead) that is supplying the common hepatic artery (short arrow) off the superior mesenteric artery (long arrow). This configuration is a common collateral pathway seen in patients with celiac axis stenosis. The patient underwent surgical decompression and experienced relief of symptoms.

- A 35 year old female with RUQ pain and hepatosplenomegaly has a liver biopsy that shows hepatic necrosis. Which is most likely?

  a. HELLP syndrome

  b. hepatic artery occlusion

  c. autoimmune liver disease

  d. Budd-chiari syndrome

- A 35 year old female with RUQ pain and hepatosplenomegaly has a liver biopsy that shows hepatic necrosis. Which is most likely?

  a. HELLP syndrome

  b. hepatic artery occlusion

  c. autoimmune liver disease

  d. Budd-chiari syndrome

BUDD-CHIARI

- Often presents with rapid onset RUQ pain. +necrosis on bx. Usually F & can occur in any age group. HELLP is similar, but usually occurs in the 2nd-3rd decade and presents with other sx of preeclampsia. Additionally, I could find no mention of splenomegaly with HELLP, while it is well know in Budd-Chiari. (source: Federle II:1:66-73, Dahnert p866 4th Ed)

- Most common tumor in the proximal small bowel;
- a. Adenocarcinoma
- b. Crohns
- c. Lymphoma

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- b. Crohns
- c. Lymphoma

- During an ERCP acinar filling is noted. This is associated with:
  - This is diagnostic of IPMT
  - This is diagnostic of chronic pancreatitis
  - This is a premalignant condition
  - This is associated with post-procedure pancreatitis
  - This is associated with biliary ductal dilatation

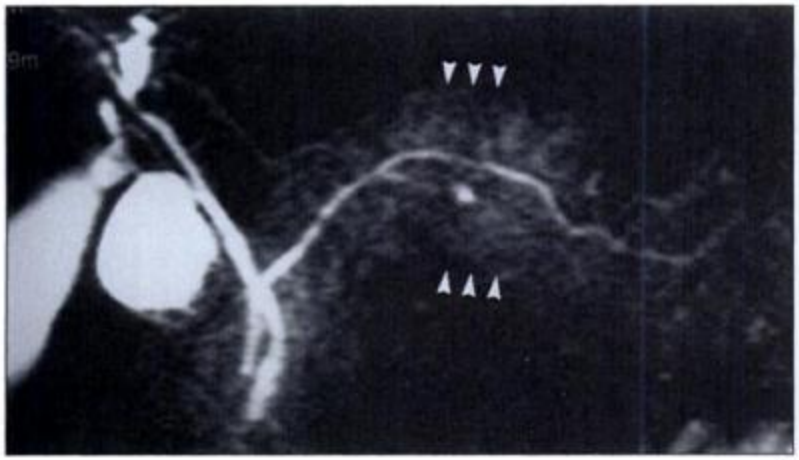
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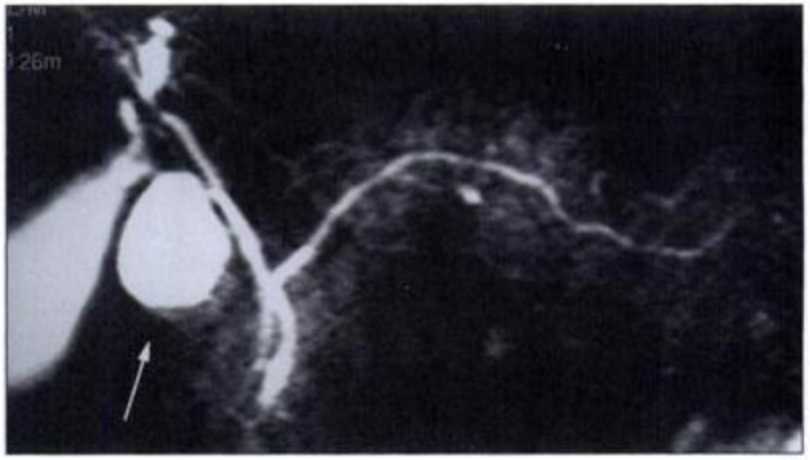
- On the following slides, there are two articles from the AJR. The first about MRCP says that acinar filling can be a sign for chronic pancreatitis. The second article about ERCP says that acinar filling is associated with postprocedural pancreatitis.
- Since this question is about an ERCP the best answer is postprocedure pancreatitis. But if it was about MRCP, I would probably choose chronic pancreatitis

Acinar Filling During Secretin-Stimulated MR Pancreatography

progressive hydrographic enhancement of the pancreatic parenchyma, "acinar filling," was observed after secretin administration.



E



F

Fig. 1.—Asymptomatic 65-year-old man with increased levels of serum amylase and lipase.
A–F, Coronal dynamic MR pancreatograms obtained before (**A**) and at 3 min 30 sec (**B**), 5 min 30 sec (**C**), 7 min 30 sec (**D**), 9 min (**E**), and 9 min 30 sec (**F**) after secretin stimulation show progressive and diffuse parenchymal enhancement on each side of pancreatic duct (*arrowheads*, **E**). Note persistent enlargement of pancreatic duct and abnormal side branch with small cyst (*arrow*, **B**). Duodenal filling is limited to bulb (*arrow*, **F**).

CONCLUSION. Acinar filling might reflect tissue hypertension or loss of pancreatic parenchyma compliance or both. This finding is probably an insensitive but specific sign of early chronic pancreatitis.

Anatomic Variants and Artifacts in ERCP Interpretation

David J. Gulliver,[1] Peter B. Cotton,[2] and John Baillie[2]

obvious on fluoroscopy. As a result, the endoscopist may inappropriately exert greater injection pressure to "fill the tail," causing overinjection and acinar filling (Fig. 10). Pancreatic acinarization not only decreases the diagnostic quality of the pancreatogram, but also carries increased risk of pancreatitis after ERCP.

- MRCP is not useful for:
  - primary biliary cirrhosis
  - choledochal cyst
  - pancreatic divisum
  - pancreatic pseudocyst
  - biliary stones

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  - **primary biliary cirrhosis**
  - choledochal cyst
  - pancreatic divisum
  - pancreatic pseudocyst
  - biliary stones

PBC

- . At most, one would look for regenerative (siderotic) nodules & fibrosis on non-MRCP T1 & T2 sequences. MRCP is commonly used for all of the other choices. (source: Federle II:1:49, Dahnert p579 4th Ed)

- Hepatic hemangioma is characterized by which of the following:
  - a rare benign lesion
  - demonstrates rapid intra-lesion flow on Doppler exam
  - hyperechoic, homogeneous & well defined lesion on US
  - increased uptake on sulfur colloid scan delayed images
  - high risk for hemorrhage

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  - a rare benign lesion
  - demonstrates rapid intra-lesion flow on Doppler exam
  - **hyperechoic, homogeneous & well defined lesion on US**
  - increased uptake on sulfur colloid scan delayed images
  - high risk for hemorrhage

ANSWER: C. HYPERECHOIC

- … Defined as such in Federle's book. Also, flow is peripheral without any significant flow in center. (source: Federle II:1:103)
- The classic findings of hemangioma on Tc-99m labeled RBC SPECT are a lesion that is undetectable or demonstrates decreased intensity compared to the liver on the flow images, and increased intensity to the liver on the 30-60 minute delayed images. These findings are **nearly 100% specific** for hemangioma
  - Brighamrad.harvard.edu

- Hepatic hydrothorax is characterized by:
  - usually left sided
  - can be seen without cirrhosis
  - can be seen with only minimal ascites
  - is treated with pleurodesis

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C. …MINIMAL ASCITES

- . HH is usually right sided (66%) and is treated medically (salt restriction, diuretics, TIPS) as pleurodesis has been shown to fail in 33%. Pt must be cirrhotic, but can have only minimal ascites when HH occurs. (source: Dahnert p365 4th Ed, www.vh.org/adult/provider/internalmedicine)

- Patients with advanced cirrhosis and portal hypertension have abnormal extracellular fluid volume regulation that in most cases results in accumulation of fluid, typically in the abdominal cavity (ascites) or lower extremities (edema). In approximately 5 to 10 percent of cirrhotic patients, fluid accumulates in the pleural space [1-3] . Hepatic hydrothorax
- The negative intrathoracic pressure generated during inspiration favors the passage of fluid from the intra-abdominal to the pleural space. Thus, many patients have only mild or no clinically detectable ascites
- *UpToDate*

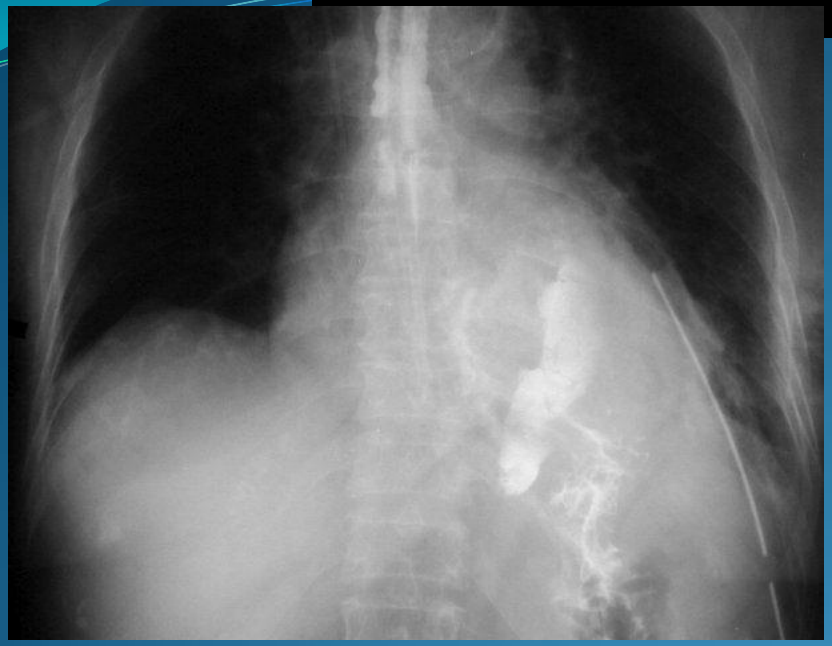
- Boerhaave's syndrome is associated with:
  - pneumomediastinum on plain radiograph is an early finding
  - usually occurs in the mid-thoracic esophagus
  - initial diagnostic study should be a barium esophagram
  - pain is a late symptom
  - bilateral pleural effusions are more common than unilateral

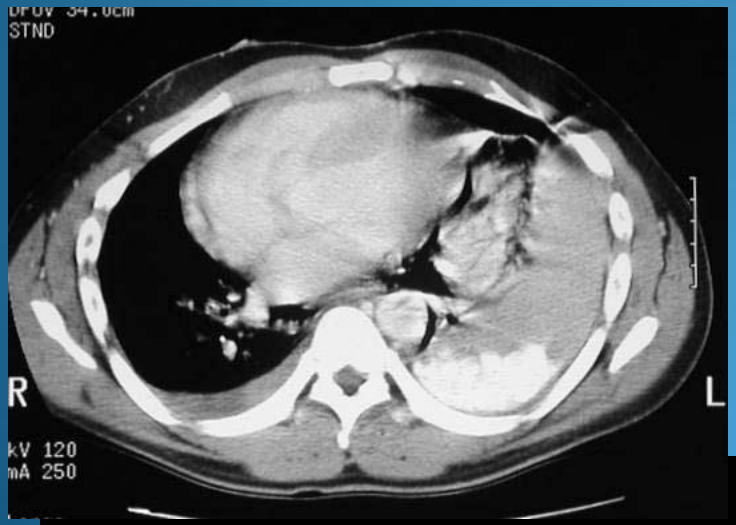
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A. PNEUMOMEDIASTINUM

- … Boerhaave's occurs in lower 2/3 of esophagus, is acutely painful, should be triaged with CXR & pleural effusions are more common on left. (source: Dahnert p664 4th Ed, Federle I:2:74-5)

- The tear in Boerhaave syndrome is at the left posterolateral wall of the lower third of the esophagus (90%)
- The most common finding is a unilateral effusion, usually on the left
- The use of barium in patients affected with Boerhaave syndrome has been associated with severe mediastinitis. Use gastrografin.
- Associated with the clinical triad of vomiting, chest pain and subcutaneous/mediastinal emphysema
  - *Emedicine & learning radiology*





- Extraluminal contrast arising from left, posterolateral tear of esophagus
- Mediastinal emphysema & extraluminal contrast in pleural space on left
  - *Learning radiology*

- In severe hypotension, which of these do NOT enhance?
- a. small bowel wall
- b. IVC
- c. spleen
- d. liver

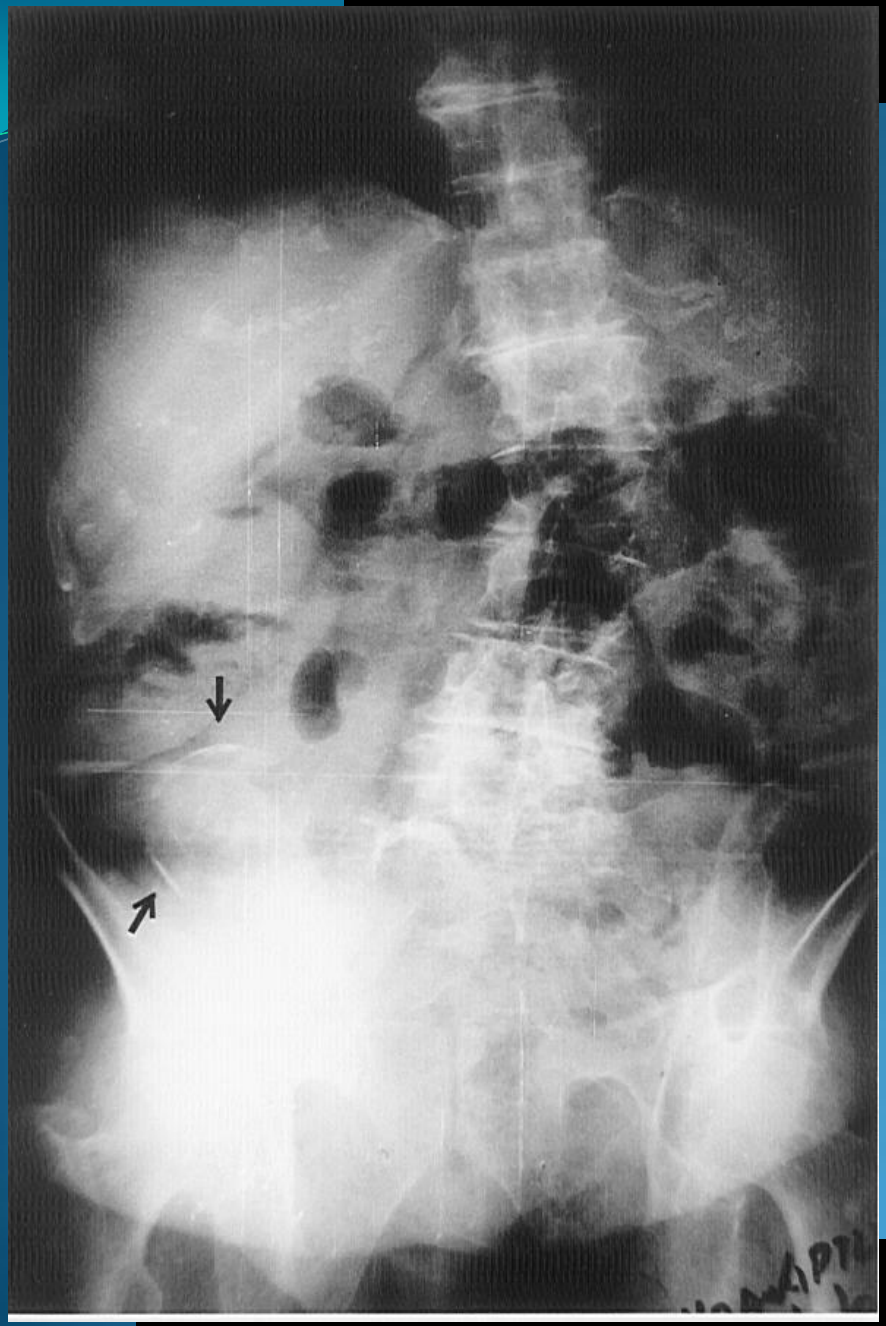
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- A fluid filled RLQ mass with peripheral calcifications is most likely:
  - mucocele
  - chronic appendicitis
  - pseudomyxoma peritoneii
  - loculated ascites
  - cecal diverticulitis

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MUCOCELE

- . Illustrated in Federle's book. Dahnert describes this finding as "highly suggestive". (source: Federle I:5:26, Dahnert p707 4th Ed)



- Plain film of the abdomen, revealing a soft tissue density lesion with peripheral calcification (arrows). A mucocele of the appendix or an echinococcus cyst may have a similar appearance.

- Regarding the plain radiographs for pts being evaluated for possible appendicitis, which is TRUE?
  a. 60% have diagnostic findings- nl in 20-50% (but that means 50-80% have findings)
  b. 50% will demonstrate an appendicolith- 7-12% adults, 50% kids
  c. Loss of the properitoneal fat stripe is diagnostic
  d. Air in the appendix, particularly when retrocecal, is diagnostic of appendicitis
  e. An appendicolith is associated with a 50% incidence of perforation

- Appendicolith in acute appendicitis means a high probability for perforation (50%), especially in children
- Conventional radiography (abnormalities seen in <50%)
- Appendicolith present in approximately 30% of children with acute appendicitis
  - *Learning radiology*
- An ascending retrocecal appendix is more likely to contain gas.
- Obliteration of normal fat planes- inflammation and edema may alter the water content of surrounding fat and obscure the normal fat planes of the psoas muscle, obturator muscle or properitoneal flank stripe. Finding is nonspecific and usually associated with other plain film findings of appendicitis

- Screening colonoscopy should begin in asymptomatic adults at age:
  a. 40
  b. 50
  c. 60
  d. only should be performed if first degree relative has history of colon ca

- Screening colonoscopy is performed after age 50 in patient with:
  - Average risk.
  - Family history of colon cancer.
  - Personal history of colon cancer.
  - Polyposis syndrome.

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50; Average risk

- Most experts, including the American Gastroenterological Association, recommend that people **with no** risk factors for colorectal cancer start screening tests at age 50.
- *WebMD*

- A patient who is status-post small bowel bypass develops renal stones of which type?
  - struvite
  - uric acid
  - matrix
  - calcium phosphate
  - calcium oxalate

- A patient who is status-post small bowel bypass develops renal stones of which type?
  - struvite
  - uric acid
  - matrix
  - calcium phosphate
  - **calcium oxalate**

CALCIUM OXALATE

- Also common in those who eat high amounts of rhubarb or OD on antifreeze. (source: http://www.urologyweb.com/Production/Urology_Primer/stones_disease/calcium_stones.html & www.asbs.org/html/story/chapter2.html
- Inflammatory bowel disease, bowel resection and small bowel bypass procedures may also lead to more absorption of oxalate by intestines.

- Which is true concerning angiodysplasia EXCEPT?
  - multiple lesions
  - along the anti-mesenteric border of the colon
  - active bleeding usually demonstrated at angiography
  - common cause of chronic GI bleeding in elderly patients
  - early draining vein on arteriography

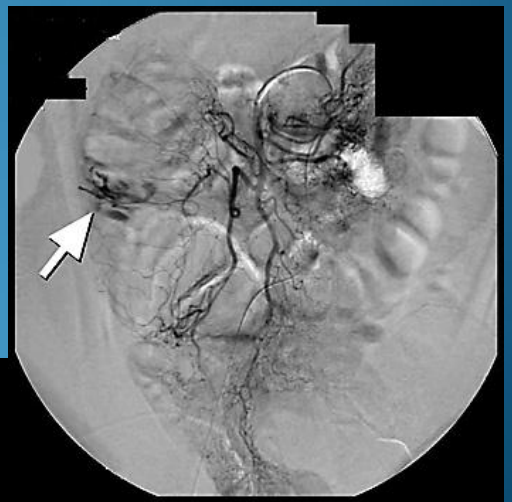
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ACTIVE BLEEDING

- Contrast extravasation during angio is very rare in AD. The rest are true. (source: Dahnert p658 4th Ed, Federle I:4:50-3)
- ANGIODYSPLASIA OF COLON= VASCULAR ECTASIA = AVM
  - Associated with: aortic stenosis (20%)
  - Incidence at autopsy: 2%
  - Age: majority >55 years
  - Location: (a) cecum + ascending colon (majority)
  - (b) descending + sigmoid colon (25%)
  - • chronic intermittent low-grade bleeding
  - • occasionally massive bleeding
    - "vascular tufts" = cluster of vessels during arterial phase along antimesenteric border
    - early opacification of ileocolic vein
    - densely opacified dilated tortuous ileocolic vein into late venous phase
    - contrast extravasation (unusual)







- Patient presents with numerous cysts in the colonic wall and pneumatosis. What is an expected association?
- A. Emphysema (?)

Emphysema

- Pneumatosis cystoides intestinalis (PCI; = pneumatosis cystoides coli) presents
- with multiple gas filled cysts of various sizes (0.5-3.0 cm) located in the
- subserosa > submucosa. It is a rare, benign condition of unknown etiology or
- incidence. PCI presents in adulthood. It predominantly involves the lower
- colon, left > right, although it can affect any part of the gastrointestinal
- tract from the esophagus to the rectum. It should be emphasized that PCI is a
- sign, not a disease.
- **Associations: Patients with PCI often have underlying lung diseases (e.g.,**
- **COPD), gastrointestinal disease (e.g., Crohn's disease or peptic ulcer**
- **disease), or collagen vascular diseases (e.g., systemic sclerosis [=**
- **scleroderma] or systemic lupus erythematosus).**
- Imaging: On plain radiographs of the abdomen, grape-like clusters of gas are
- visible, usually located in a segment of the colon. It is best demonstrated on
- CT, which reveals segmental mucosal nodularity. On barium study, cystic gas
- collections may protrude into the lumen of the colon causing a scalloped
- appearance. Alternatively, multiple round or oval filling defects may be seen,
- that closely simulate multiple polyps (see figure). Symptoms: Patients are
- usually asymptomatic.

- Complications include asymptomatic pneumatosis or large
- pneumoperitoneum,, which may persist for months or years. At the other extreme,
- PCI may be associated with serious life threatening septic illness, e.g., it
- can be seen in adults with bowel necrosis due to bowel ischemia, infarction,
- necrotizing enterocolitis, neutropenic colitis, volvulus, and sepsis. The
- following symptoms, in decreasing order of frequency, were reported in patients
- with PCI: diarrhea, bloody stools, abdominal pain, abdominal distention,
- constipation, weight loss, and tenesmus from rectal involvement
- Treatment: Pneumatosis cystoides intestinalis is usually not treated. If
- treatment is desired, therapy consists of breathing gas rich in oxygen. By
- diffusion, oxygen replaces the gas in the cysts, and the cysts collapse.
- Obviously, this therapy cannot be used for patients with serious underlying
- lung conditions. In addition, broad- spectrum antibiotics, metronidazole,
- steroids (prednisone), and hormones (somatostatin analogues) have been applied
- with good results. Bismuth has also been used in the treatment of PCI, but it
- requires long-term administration, which may result in generalized skin
- pigmentation and bismuth poisoning.

2003

- Barium exam shows multiple, < 1 cm polyps in the fundus and body of the stomach. Most likely due to?
  a. Peutz-Jegher
  b. Cronkite-Canada
  c. familial polyposis
  d. hyperplastic/inflammatory

2003

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  d. hyperplastic/inflammatory

- ***B. Hyperplastic polyps***
- *Hyperplastic/inflammatory make up 80% of gastric polyps. Sources state they can be seen anywhere: fundus and body (per Primer), antrum (per GI Requ), or anywhere per CHORUS. Use of PPI's may be assoc with fundal hyperplastic polyps*
- *Peutz-Jegher = hamartomas. Rare. autosomal dominant (50% sporadic). primarily of SB, also: stomach, colon, occasionally of urinary or respiratory tract, mucocutaneous hyperpigmentation. In young patients, small intestinal obstruction and intussusception are the main complications of Peutz-Jeghers syndrome. This is due to the small intestinal location of the polyps. Cancer is the main consequence as patients with Peutz-Jeghers syndrome age (93% cumulative risk by age 64 y). The major sites of cancer occurrence in order are small intestine, stomach, pancreas, colon, esophagus, ovary, lung, uterus, and breast (RR 15.2).*
- *Familial polyposis = adenomas. characterized by the presence of hundreds to thousands of adenomatous polyps throughout the colon. All patients with this syndrome develop colon cancer if they are not treated. If the sigmoidoscopy or colonoscopy findings lead to a diagnosis of FAP, an esophagogastroduodenoscopy should be performed to evaluate for the presence of duodenal and periampullary adenomas. Benign fundic gland polyps often are observed in the fundus and body of the stomach. d. adenoma from FAP (only 5%, but 50% of FAP have HAMARTOMA in stomach). Colon screening should begin at puberty for family members of familial polyposis*
- *Cronkite-Canada: hamartomas. Rare. This syndrome is hyperpigmentation, alopecia, glossitis, dystrophic nails and gastrointestinal manifestations (diarrhea, hamartomatous polyps, and exocrine pancreas* insufficiency

- **A. Peutz-Jegher (maybe)**
- Peutz-Jegher can give diffuse involvement with multiple polyps in the stomach in about 25% of cases. More common than Cronkhite-Canada syndrome.
- Cronkhite-Canada syndrome will have multiple polyps in the stomach (100%), colon (100%) and small bowel (>50%)
- ***Dahnert 5th 810-811, 852-853***
- Basically, I think PJ is more likely than CC because it's more common. However, if the question asks which is more likely to involve the stomach, CC is the best answer.
- **Polyposis syndromes**
- When polyps in the stomach are associated with polyposis syndromes, these syndromes include juvenile polyposis, Gardner, Peutz-Jeghers, and Cronkhite-Canada syndromes.
- Juvenile polyposis and Cronkhite-Canada syndrome rarely result in gastric cancer.
- Peutz-Jeghers syndrome involves gastric hamartomatous polyps. The gastric involvement is generally less than that observed in the small intestine. These polyps can bleed or obstruct the antrum and should be treated accordingly. Although patients with Peutz-Jeghers syndrome may occasionally develop gastric cancer, other nongastrointestinal cancers are more common.
- Adenomatous polyps of the stomach and duodenum develop in 50% of cases of familial polyposis and Gardner syndrome. Polyps are usually multiple, and they are best treated endoscopically. Multiple treatments every 3-4 months may be necessary for complete eradication. Routine surveillance endoscopy should be instituted as a life-long program. Patients with Gardner syndrome develop adenomatous polyps in the duodenum as well as in the stomach and should undergo routine esophagogastroduodenoscopy.

- **Pseudodiverticulosis of the esophagus is associated with**
- gastroesophageal reflux
- Candida
- Congenital variant

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- Congenital variant

gastroesophageal reflux

Gerd is a more common cause, *emedicine*

- Pseudodiverticulosis has numerous small esophageal outpouchings representing dilated glands interior to the muscularis. Underlying diseases: candida, EtOH, DM. Associated with esophagitis. (Primer 160)

- Which of the following entities is most likely to involve the *proximal* small bowel?
  a. Crohn's
  b. Meckel's diverticulum
  c. adenocarcinoma
  d. Non-Hodgkin's lymphoma
  e.

- What is the most common cause of a small bowel mass localized in the ileum of an adult?
  a) adenocarcinoma
  b) carcinoid
  c) lymphoma
  d) Crohn's (don't remember for sure if this was one of the choices or not)

- **C. Adenocarcinoma**
- Approx 50% of adenocarcinomas of the SB involve the duodenum.
  - ***Dahnert 5th 788***
- Crohn's involves the duodenum in 4-10%.
  - ***Dahnert 5th 809***
- Lymphoma involves the duodenum in about 2%.
  - ***Dahnert 5th 842***
- Meckel's diverticula occur in the ileum.
  - ***Dahnert 5th 845***

- **Which of the following more commonly involves the PROXIMAL small bowel?**
  - **a. Adenocarcinoma- if the duodenum is included primary adenocarcinoma is the most common primary malignancy and duodenum is the most common site. More frequently jejunum than ileum. 0.5-3 per 100,000 worldwide**
  - **b. Lymphoma- 0.9-1% gi tumors in US. Most occur in the distal ileum, and duodenum least frequently**
  - **c. Crohn's- SB only 29%, SB and colon 50%, colon only 19%, anorectal 2%. More commonly distal SB**
  - **d. TB- usually colon**

- ***ANSWER: B.* Carcinoid comprises 25-41% of malignant small bowel masses. Dahnert states SB carcinoids are "predominantly" (80-90% according to some sources) in the distal ileum. AdenoCA comprises 25% of malignant SB masses (48% in duodenum, 44% jejunum, 8% ileum). Lymphoma comprises 17% of malignant SB masses. While Crohn dz commonly affects TI, more likely to be stricture or asymmetric transmural involvement than "mass". *(source: Dahnert p637, 4th Ed)***

- A 14 yo Asian child has upper GI bleeding, esophageal varices, and normal liver enzymes. Likely cause?
  a. schistosomiasis
  b. cirrhosis
  c. Budd-Chiari
  d. Oriental cholangitis

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A. Schistosomiasis

- *Dahnert 5th 737*
- **Infections peak in individuals aged 10-19 years**
  - *emedicine*

- **14 yo asian male with massive hemoptysis, multiple perigastric varices, and normal liver function tests most likely has:**

a. Schistosomiasis- splenomegaly, esophageal and gastric varices, peripheral hepatic or capsular calcification, pseudoseptations and geographic bands of calcification and notches in the liver margin "turtle back". Prominent periportal hypodensity may also be present

b. Hepatic Fibrosis- congenital hepatic fibrosis can give similar findings however it is quite rare and has renal findings. When it is developmental it will be in the setting of cirrhosis and will have abnormal LFTs

c. Hepatoblastoma- usually younger than 3 years old. Generally abnormal LFTs

d. Cholangiocarcinoma- average age 65. No portal hypertension

- Which of the following findings on liver ultrasound is NOT usually seen in cirrhosis?
  a. Caudate lobe atrophy
  b. Left lobe hypertrophy
  c. Nodular surface
  d. Increased echogenicity
  e. Increased size of the hepatic artery

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a. **Caudate lobe atrophy**

b. Left lobe hypertrophy

c. Nodular surface

d. Increased echogenicity

e. Increased size of the hepatic artery

Caudate lobe atrophy

- In cirrhosis, the right lobe and medial segment of the left lobe become atrophic. There is concomitant hypertrophy of the lateral segment of the left lobe and caudate lobe.
- On US, one may see hypertrophy of the caudate.
- ***Dahnert 5th 696***

- A patient has had a liver transplant. Ultrasound shows a dilated common bile duct. You should schedule a follow-up US to look for:
  a. thrombosis of hepatic artery
  b. bile leak
  c. abscess
  d. portal vein occlusion

- A patient has had a liver transplant. Ultrasound shows a dilated common bile duct. You should schedule a follow-up US to look for:
  a. **thrombosis of hepatic artery**
  b. bile leak
  c. abscess
  d. portal vein occlusion

Thrombosis of hepatic artery

- Biliary obstruction and bile leaks are common complications following liver transplantation. Both may be caused by thrombosis of the hepatic artery.
- Ultrasound is not a good way to evaluate for bile leaks, but it is a good way to look for hepatic artery occlusion.
- ***Dahnert 5th 718***

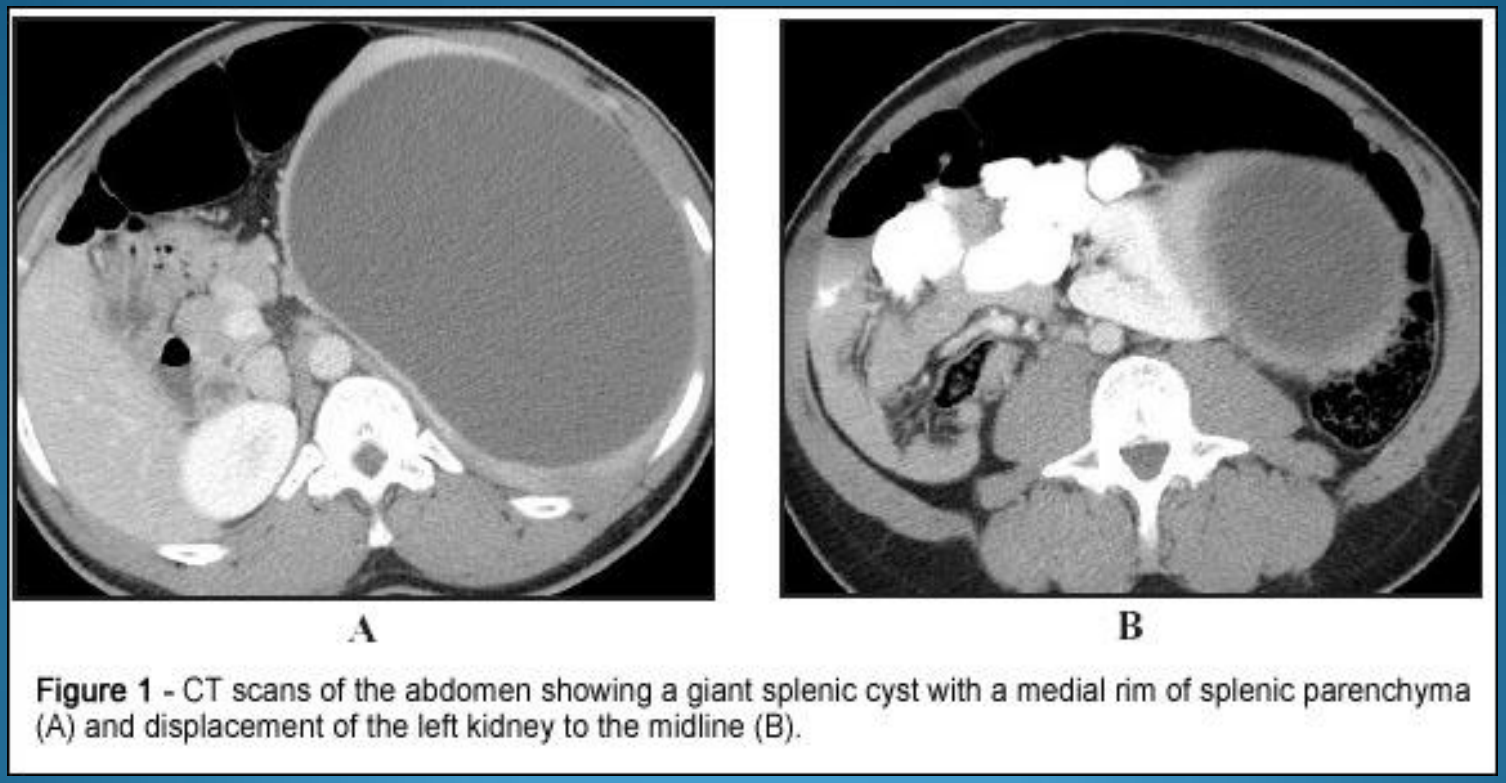
- Abdominal CT with contrast shows epidermoid cysts in the spleen. The high density is due to:
  a. echinococcus granulosus
  b. protein
  c. trauma
  d. Septations
- Epidermoid cysts of the spleen typically show what feature (? On CT):
  a. Trabeculated appearance-
  b. Hyperdense- most commonly would be hypodense

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SFH

- Protein & Trabeculated Appearance
- Epidermoid Cysts
  - True congenital lesions discovered incidentally
  - Often with trabeculations or septations and occasionally peripheral calcification
  - These have an epithelial lining
    - *AFIP Notes p. 469*



A

B

Figure 1 - CT scans of the abdomen showing a giant splenic cyst with a medial rim of splenic parenchyma (A) and displacement of the left kidney to the midline (B).

- Trabeculated spleen lesion has high T2 signal on MRI, what is the likely diagnosis?
- a. Lymphoma
- b. Metastatic melanoma
- c. Epidermoid
- d. Infarct

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- a. Lymphoma
- b. Metastatic melanoma
- **c. Epidermoid**
- d. Infarct

Epidermoid

- Epidermoid cyst of spleen: well-defined thin walled lesion of water density,
- average size 10cm, with peripheral septations and cyst wall trabeculations (in 86%)

- What is true about the ligamentum teres?
  a. it is the same thing as the falciform ligament
  b. it represents the obliterated umbilical vein
  c. it represents an obliterated umbilical artery

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Obliterated umbilical vein

- Ligamentum teres is the remnant of the obliterated umbilical vein.
- It runs in the falciform ligament and divides the left lobe into medial and lateral segments.
- ***Dahnert 5th 675***

- The ligamentum teres is which of the following:

a. The remnant of the umbilical vein- The ligamentum teres is the obliterated fibrous remnant of the left umbilical vein of the fetus. It originates at the umbilicus. It passes superiorly in the free margin of the falciform ligament. From the inferior margin of the liver, it may join the left branch of the portal vein or it may be in continuity with the ligamentum venosum

b. The remnant of the ductus venosus- ligamentum venosum

c. The falciform ligament- the remnant of the peritoneal fold containing at its base the obliterated umbilical artery. It extends from the umbilicus and anterior abdominal wall to the anterior surface of the liver.

- A patient has left lower quadrant pain. A CT scan shows inflammation in the LLQ, with a fatty center and enhancing rim. Most likely cause?
  a. diverticulitis
  b. epiploic appendagitis
  c.
  d.

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Epiploic appendagitis

- Pericolic oval-shaped pedunculated mass, 1-4cm in diameter, with fat attenuation and hyperattenuating rim. Also periappendigeal fat infiltration. Resolves spontaneously.
- ***Dahnert 5th 817-818***

a. Epiploic appendagitis- The findings on CT are a mass with negative attenuation values indicating the presence of fat. This hypoattenuating mass is bordered by an hyperattenuating peripheral ring corresponding to the oedematous serosa.

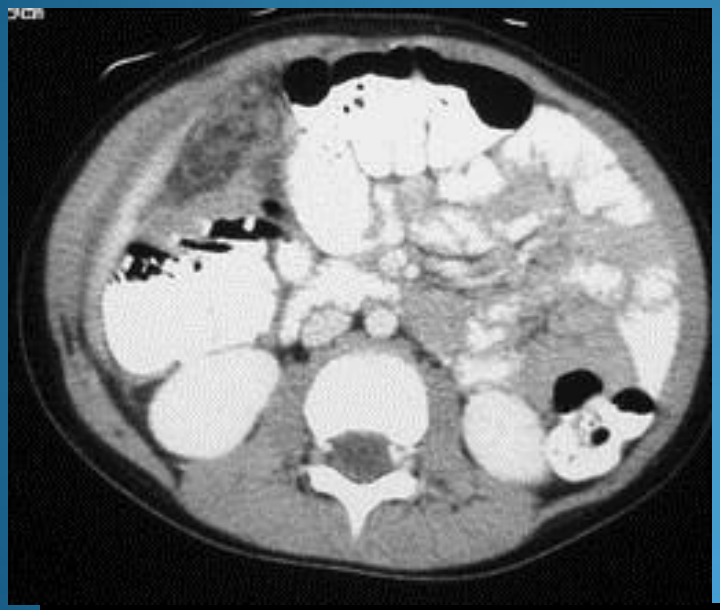
b. Liposarcoma- CT scans demonstrate 3 distinct patterns: (1) an enhancing, solid, inhomogeneous, poorly defined, infiltrating mass; (2) a mixed-pattern tumor with foci of fat interspersed in high-attenuating tissue; and (3) a pseudocystic water-density tumor.

c. Lipoma- The right side of the colon is involved more frequently than the left. The majority of noncomplicated colonic lipomas will not cause clinical complaints. However, recurrent intussusception of the tumour may cause intermittent abdominal pain whereas ulceration of the mucosa overlying the tumour may lead to intestinal blood loss

d. Diverticulitis



- Epiploic appendagitis



- Omental infarct

- Cronkite-Canada includes which of the following?
  a. Nail dysplasia / dystrophy
  b. Osteomas
  c. Mucosal hyperpigmentation
  d. Malabsorption syndrome

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  a. Nail dysplasia / dystrophy

  b. Osteomas

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  d. Malabsorption syndrome

Nail dysplasia / dystrophy

- *Dahnert 5th 810-811*

- **Cronkhite-Canada syndrome (CCS) is an extremely rare nonfamilial syndrome resulting from profound epithelial disturbances in the gastrointestinal (GI) tract and epidermis. The GI changes are generalized hamartomatous polyposis with abnormal intervening mucosa.**
- **Approximately two thirds of all cases occur in individuals of Japanese descent**
- **Diarrhea, alopecia, hyperpigmentation of skin, and nail dystrophy**

- Which of the following statements is true regarding giardia?
  a. causes bleeding
  b. may cause a malabsorption syndrome
  c.
  d.

- Regarding Giardia infection, which of the following is TRUE
  a. Negative stool cultures exclude the diagnosis
  b. Usually affects the distal ileum
  c. Usually associated with GI bleeding

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- ***Dahnert 829***
- Regarding Giardia infection, which of the following is TRUE: **none** of these appear to be true

a. Negative stool cultures exclude the diagnosis- Stool cultures are not useful in making the diagnosis of giardiasis because the organism cannot reliably be grown from patient samples. G lamblia is identified in 50-70% of patients after a single stool examination and in more than 90% after 3 stool examinations, If the stool is not fresh or is semiformed to formed, trophozoites will not be found.

b. Usually affects the distal ileum- combination of mucosal edema, irritability, rapid transit of barium through the proximal small bowel, abnormal clumping of barium with evidence of increased secretions, narrowing of the bowel lumen, and localization of the pathological features to the duodenum and jejunum is typical of giardiasis and highly suggestive of the diagnosis

c. Usually associated with GI bleeding- very rarely

- The most common tumor to metastasize to the spleen is:
  a. Melanoma
  b. Renal Cell carcinoma
  c. Breast cancer
  d. Lung caner

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Melanoma

- AJR

RADIOLOGIC DIAGNOSIS OF SPLENIC METASTASIS*

SPLENIC metastases are relatively rare, occurring in 2 to 4 per cent of large series of metastatic tumors.[6,8,18] The most common secondary tumors are sarcomas, principally the malignant lymphoma group.[12] Discrete nodular tumor masses in the spleen occur in reticulum cell sarcoma and Hodgkin's disease, but not in lymphocytic or lymphoblastic lymphomas.[1] Metastases from other tumors are rare,[3,14,15,19] and usually occur with generalized carcinomatosis, although isolated splenic metastases have been reported.[4,16] An exception to this generalization is widely disseminated melanoma where the spleen is involved in about one-half of the cases.[12]

- Splenic mets:
  - Melanoma (6-34%)
  - Breast (12-21%)
  - Lung (9-18%)
  - Colon (4%)
  - RCC (3%)
  - Ovary (8%)
  - Prostate (6%)
  - Stomach (7%)
  - Pancreas, endometrial
- ***Dahnert 5th 670***
- ***Lymphoma not a choice***

- **Aneurysmal dilatation of the small bowel is a feature most likely to be seen in which of the following:**
  a. lymphoma
  b. Carcinoma
  c. Carcinoid
  d. Lipoma

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  c. Carcinoid

  d. Lipoma

A. Lymphoma

- May see aneurysmal dilatation due to destruction of autonomic nerve plexus +/- muscle/ tumor necrosis.
- Dahnert 5th 842
  - B. Lymphoma- The radiographic appearance of small intestinal lymphoma on barium examination may be that of aneurysmal dilatation with or without fistula formation, multiple nodular defects and segmental irregular narrowing of the lumen.
  - C. Carcinoid- Duodenal carcinoid: On barium series, tumors appear as intraluminal polypoid lesions or infiltrating lesions that cause an irregular stricture, Small-bowel carcinoid Plain abdominal radiographs may reveal curvilinear calcification within the abdomen. These are usually smaller than 15 mm in diameter and result from calcification within the tumor. On barium studies, findings comprise fairly well-defined, round, intraluminal, bowel-filling defects. These may be associated with thickening of the valvulae conniventes resulting from interference of the bowel blood supply by the tumor
  - d. GIST- The diagnosis of GIST can be suggested in the presence of a large, complex, intestinal mass with liver lesions but without significant lymphadenopathy

- A pt. with dysphagia has multiple small ulcers in the proximal esophagus on barium study. Most likely cause?
  a. HIV
  b. CMV
  c. Candida
  d. metastatic melanoma
  e. Herpes

- Which of the following is most commonly associated with large flat ulcers on an esophagram:
  - CMV
  - Herpes esophagitis
  - Candida
  - HIV esophagitis

- Large ulceration (>3cm) is NOT associated with which of the following:
  - HIV esophagitis
  - herpes esophagitis
  - CMV esophagitis
  - esophageal carcinoma

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  - HIV esophagitis
  - **herpes esophagitis**
  - CMV esophagitis
  - esophageal carcinoma

- **E. Herpes**
- Multiple small discrete superficial ulcers surrounded by radiolucent halos of edematous mucosa. Occurs in midesophagus.
- Candida gives mucosal nodularity, longitudinal plaques or "shaggy" contour. pseudodiverticulosis.
- Melanoma: in GI tract, get multiple submucosal nodules with a bulle-eye/ target appearance from central ulceration.
- *Dahnert 5th 821-822*

- **D. HIV ESOPHAGITIS**.
- Both CMV and HIV can cause Giant ulcers in the esophagus. In the study by Levine et al. (Sor S, Levine MS, et al., Giant ulcers of the esophagus in patients with HIV: clinical, radiographic, and pathologic findings, Radiology 1995 Feb;194(2):447-51) which studied 21 HIV+ patients, HIV was the more common cause (76%) compared with CMV (14%). 10% of patients had both. Dr. Levine discussed this paper at AFIP in his Esophagus lecture.
- CMV is another cause of giant ulcers of the esophagus. Appearance mimics HIV, but HIV more common. Path: viral inclusion bodies w/in nucleus surrounded by halo produce "owl's eye" appearance. CMV can also cause gastritis, colitis, TI-itis.
- Candida: diffuse mucosal irregularity -> fold thickening -> shaggy or cobblestone appearance. Irregular plaques and ulcers. Oral candidiasis is most common complication of HIV+.
- *(Gore & Levine, 1994 ed, 2687-9) AFIP*

- **Answer (b) Herpes**
- Herpes esophagitis radiographically appears as superficial small ulcers < 5mm, when severe it can appear like Candida except that it does not have diffuse plaque formation.
- Lastly, ulceration in esophageal carcinoma is usually large (95% are of squamous cell origin). Ulcerations in esophageal carcinoma are a relatively uncommon presentation of this type of cancer.
- *(sources: Eisenberg 2nd edition pgs 52-63, MGH pg 155)*

- Immunosuppressed person with severe odynophagia & multiple tiny (2-3mm) ulcers in mid esophagus most likely has:
  a. Herpes- mid esophagus shallow ulcers
  b. Candida- white plaques
  c. CMV- distal, large ulcers
  d. HIV- giant deep ulcers
  e. Gastroesophageal reflux

- Unique findings due to various causes of esophagitis:
-
- Candida albicans- most (75%) also have thrush; plaques are usually creamy white or pale yellow, with underlying raw mucosa. Brushings should be obtained with a sheathed cytology brush, spread onto slides, and stained with periodic acid-Schiff, silver, or Gram stains. The presence of mycelial forms and masses of budding yeast is consistent with candidal infection.
-
- HSV- Patient has abrupt onset of symptoms. Diagnosis is usually determined at endoscopy. The earliest esophageal lesions are rounded 1- to 3-mm vesicles in the middle to distal esophagus. Later on the centers slough to form discrete circumscribed ulcers with raised edges. The ulcers may look a lot like Candida plaques later in the infection. Biopsy of the edge of the ulcers can be used to look for multinucleated giant cells (Tzanck test), to culture for the virus, and to prepare histological sections for immunohistochemistry using monoclonal antibodies to HSV.
-
- CMV- Unlike HSV esophagitis the onset of symptoms is more gradual. Esophagitis is the second most common GI manifestation of CMV after colitis. CMV esophagitis has been reported in transplant patients, patients undergoing long-term renal dialysis, patients with HIV/AIDS, and patients with other debilitating diseases. No cases of CMV have been reported in healthy hosts. Diagnosis is made by endoscopy with biopsies performed to culture for the virus. Usually large solitary shallow ulcers or multiple discrete lesions are present and are usually at the distal end of the esophagus.
-
- HIV- Multiple, small, aphthoid (thrush-like) lesions are observed during the period of transient fever, chills, malaise, and rash of early HIV infection. Later, giant deep ulcers extending up several centimeters can be seen. Fistula formation, perforation, hemorrhage, or superinfection may complicate large ulcers.
-
- VZV- Usually also have dermatologic lesions consistent with chickenpox or shingles. Endoscopy is also performed

- **Muscosa-Associated Lymphoid Tissue (MALT) lymphoma is most closely associated with :**

a. Helicobacter pylori
b. Zollenger-Ellison syndrome
c. Nodular hyperplasia

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a. **Helicobacter pylori**
b. Zollenger-Ellison syndrome
c. Nodular hyperplasia

A. Helicobacter pylori

- **roughly 70% of gastric MALTomas are associated with Helicobacter pylori infection**
  - *emedicine*

- **Which of the following is true regarding Zenker's diverticulum--**
  a. muscular contractions lead to emptying
  b. posterior midline of the lower pharynx
  c. inferior to cricopharyngeus
  d. traction diverticulum

- An esophagram shows a 2 cm anterolateral outpouching near the cricopharygeus muscle. What is the most likely diagnosis?
  - Pharyngeal diverticulum
  - Pharyngeal pouch
  - Killian-Jamison diverticulum
  - Zenker's diverticulum

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  - **Killian-Jamison diverticulum**
  - Zenker's diverticulum

B. Posterior midline of the lower pharynx

Dahnert 5th 866

- What is TRUE regarding a Zenker's diverticulum?
  - a. posterior midline above the cricopharyngeal muscle- Zenker diverticulum occurs at an area of potential weakness in the inferior pharyngeal constrictor muscle referred to as the Killian dehiscence. It is located between the obliquely oriented fibers of the thyropharyngeal muscle and the horizontally oriented fibers of the cricopharyngeal muscle
  - b. Inferior to cricopharyngeal muscle
  - Clears by smooth muscular contraction- pseudo zenker

- (c) Killian-Jamison diverticulum is the correct answer.

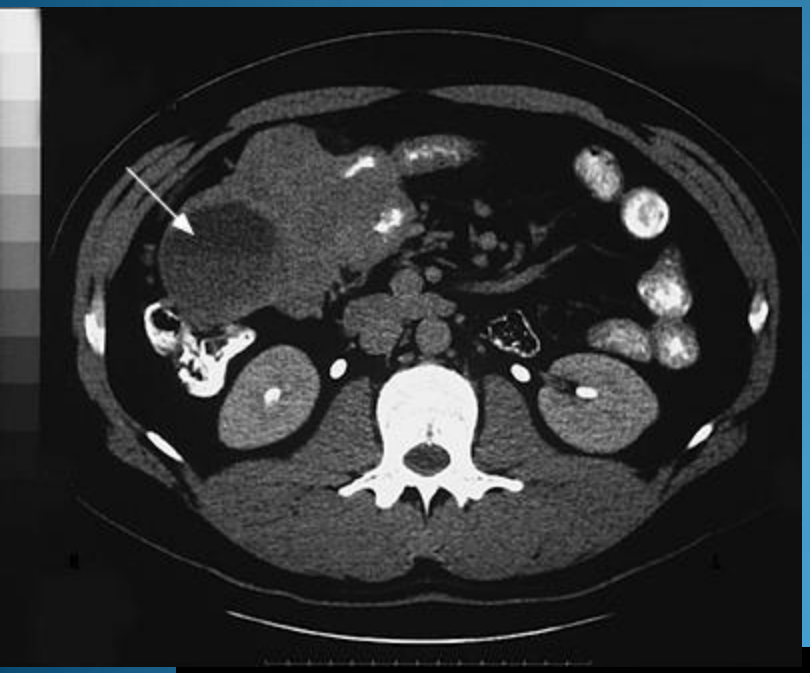
- Pharyngeal pouch (lateral pharyngeal pouch) – usually asymptomatic; transient, hemispheric protrusions through thyrohyoid membrane from LATERAL hypopharyngeal wall. Pharyngeal diverticulum (lateral pharyngeal diverticula) – persistent protrusions through from LATERAL pharyngeal wall through thyrohyoid membrane or rarely tonsillar fossa; lined by nonkeratinized squamous epithelium; glass blowers, wind instrument players. Laryngocele – saccular dilatation of appendix of laryngeal ventricle (space between false and true vocal cord); lined by ciliated pseudostratified columnar epithelium; internal laryngocele – confined by thyroid cartilage, external laryngocele – above thyroid cartilage and through thyrohyoid membrane, or mixed laryngocele; LATERAL > ANTEROLATERAL on CT anterior to carotid and jugular vessels, medial to sternocleidomastoid muscle; glass blowers, wind instrument players. Zenker's diverticulum (posterior hypopharyngeal diverticulum) – acquired mucosal herniation between fibers of cricopharyngeus muscle (Killian's dehiscence) or between thyropharyngeal and cricopharyngeal muscles; associated grastroesophageal reflux, hiatal hernia; reflux esophagitis; barium-filled POSTEROLATERAL pouch below level of cricopharyngeal muscle and posterior to cervical esophagus. Killian – Jamieson diverticulum or pouches (lateral cervical esophageal pouches or diverticula) - Killian – Jamieson space is triangular space of weakness below cricopharyngeal muscle; 3 to 20 mm, saccular protrusions from ANTEROLATERAL pharyngeal wall below level of cricopharyngeal muscle and anterior to cervical esophagus. [Ref. Gore & Levine]

- **Which of the following is true concerning leiomyosarcoma of stomach?**
  a. larger tumor may show cystic area of necrosis
  b. treated with chemo and XRT

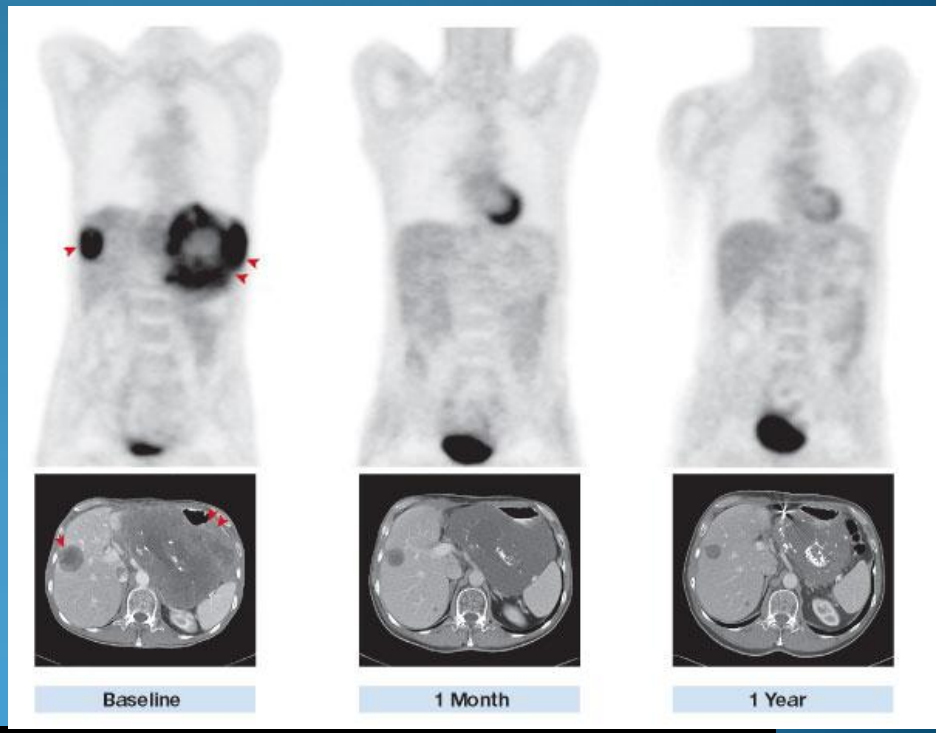
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A. Larger tumor may show cystic area of necrosis

- Leiomyosarcomas are large submucosal lesions with single, multiple, or cavitary ulcerations. These masses tend to grow silently to a very large size and have central hemorrhage and necrosis. They may be pedunculated or exogastric. They metastasize hematogenously. Histologic differentiation from leiomyoma is difficult and differentiation is based on size, gross appearance, and behavior of the tumor. Chemo and XRT have not proven useful. (*Brant and Helms p. 727,* ***Dähnert 840****)*
  http://www.emedicine.com/med/topic1180.htm



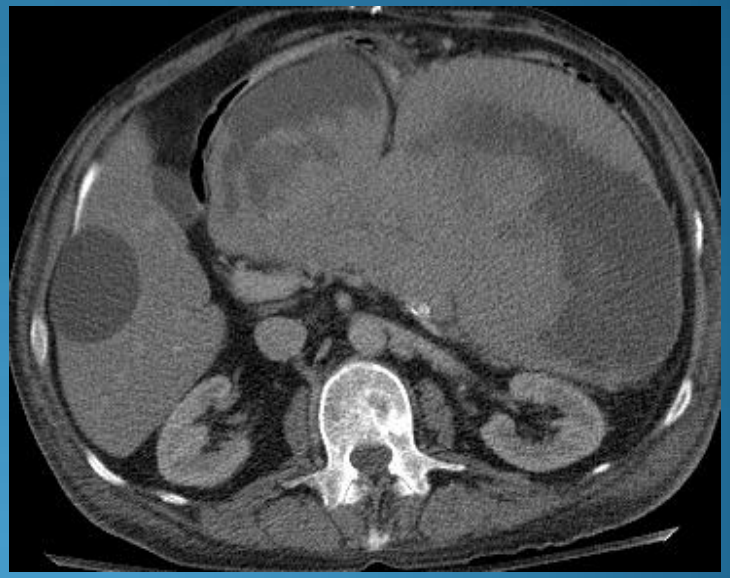
Gist ileium



Gist stomach

Leiomyosarcomas





- The esophagus does NOT have which of the following:
  a. Serosa
  b. Muscularis mucosa
  c. Circular muscle
  d. Longitudonal muscle

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Serosa

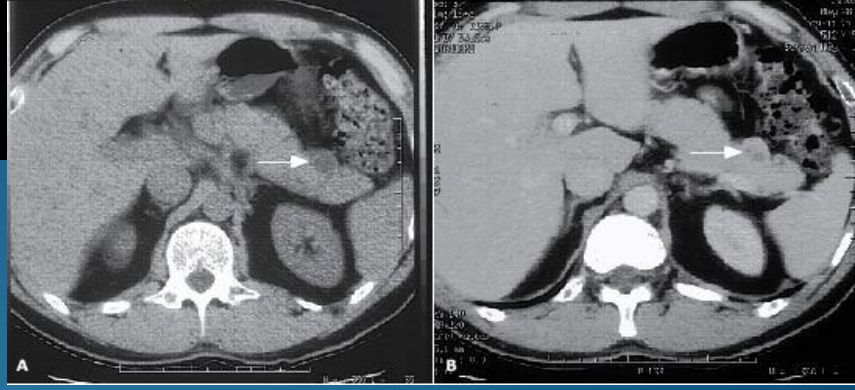
- The esophogus is composed of an inner mucosal layer, a circular muscle layer and a longitudinal muscle layer. The musculature of the upper 1/3 is skeletal muscle while the lower 2/3 is smooth muscle. In contrast to the rest of the GI tract, there is no serosal layer. This is significant because it explains the ease of extension of neoplasms that originate in the esophogus and the ease at which esophogeal perforation occurs. (Essentials of General Surgery, 2nd edition)

- The wall of the esophagus consists of mucosa, submucosa and muscularis propria. Unlike other areas of the gut, it does not have a distinct serosal covering, but is covered by a thin layer of loose connective tissue, adeventitia.

- **Regarding islet cell tumor of pancreas:**
  a. insulinomas are usually malignant
  b. non-functioning tumor usually have not metastasized at the time of diagnosis
  c. glucagonomas are the most common
  d. associated with VHL
  e. usually hypovascular

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D. Associated with VHL



- Insulomas are usually benign (~10% malignant)
- Association with VHL
- Glucagonomas are rare. Insulinomas most common.
- Usually hypervascular.
- Nonfunctioning tumors may grow large before becoming symptomatic.
- ***Dahnert 5th 725-726, 329***
- ***a. Von Hippel Lindau pts have an increased incidence of insulinomas- VHL has an increased incidence of islet cell tumors (presumably of all types)***
- ***b. Most are malignant- 90% benign, non functional islet cell tumors are mostly malignant***
- ***Most have distant metastases at the time of diagnosis- most are benign so won't be metastatic. The benign or malignant nature of these lesions is determined by mets/local invasion as there is no radiologic difference***
- ***Approximately 10% of insulinomas are malignant (metastases are present), and 10% are multiple, particularly in patients with multiple endocrine neoplasia type 1 (MEN 1). Of patients with multiple insulinomas, 50% have MEN 1. Insulinomas are associated with MEN 1 in 5% of patients. On the other hand, 21% of patients with MEN 1 develop insulinomas.***
- ***Nonfunctional islet cell cancers account for approximately one-third of all cancers of the endocrine pancreas, and the majority of these are malignant***

2002

- **CT shows a large spleen and hyperdense liver and pancreas:**
  a. Fatty infiltration
  b. Cystic fibrosis
  c. Hemochromatosis
  d. Iron overload
  e. Gaucher's disease

- MRI shows splenomegaly with a liver and pancreas that are both markedly hypointense. What is the most likely diagnosis?
  - Gaucher's disease
  - Hemachromatosis
  - Iron overload from transfusional therapy.

2002

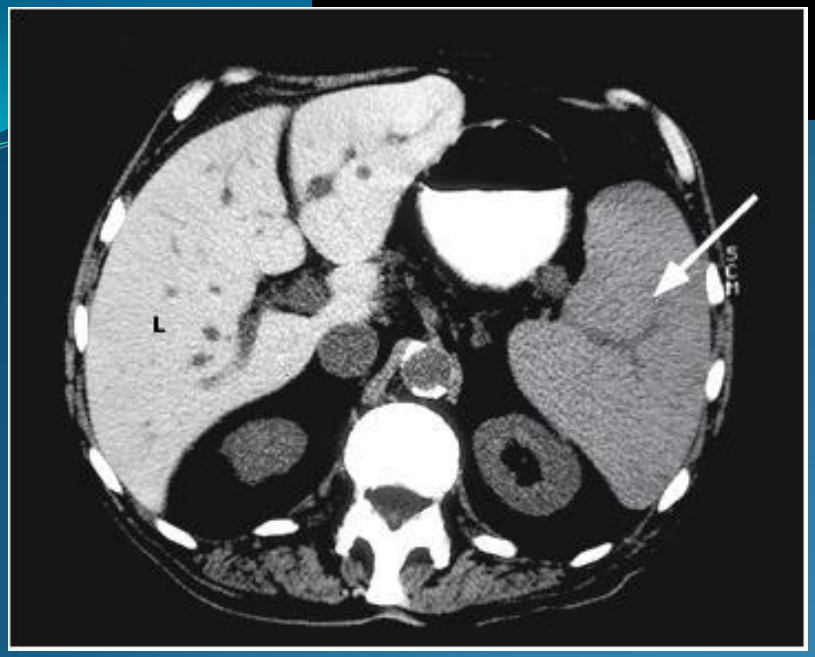
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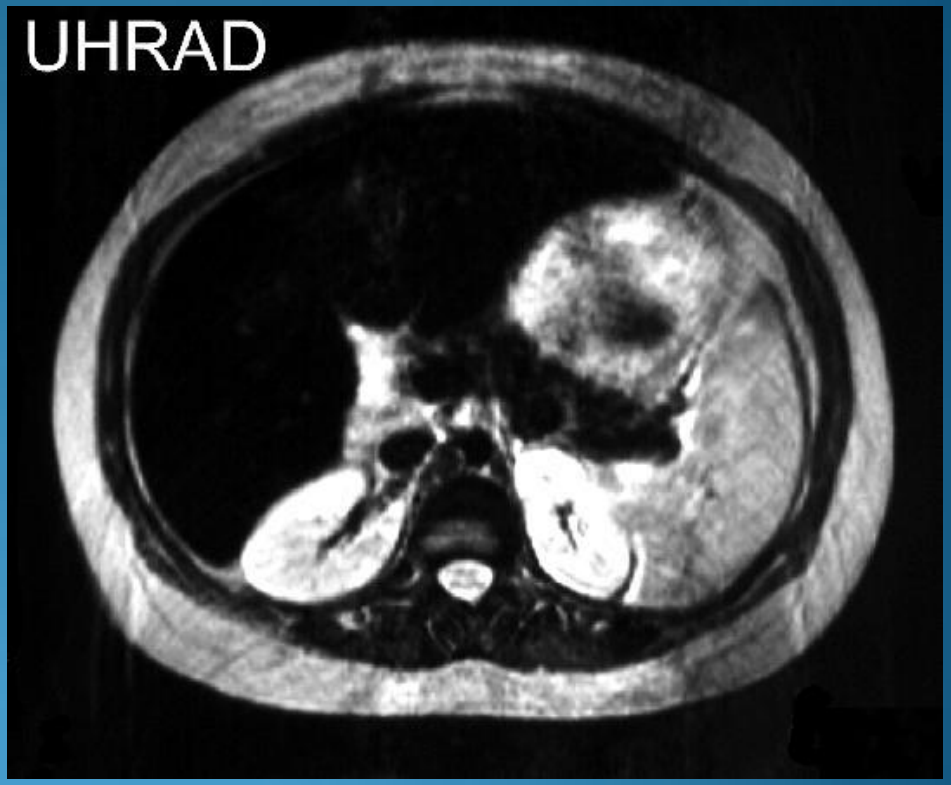
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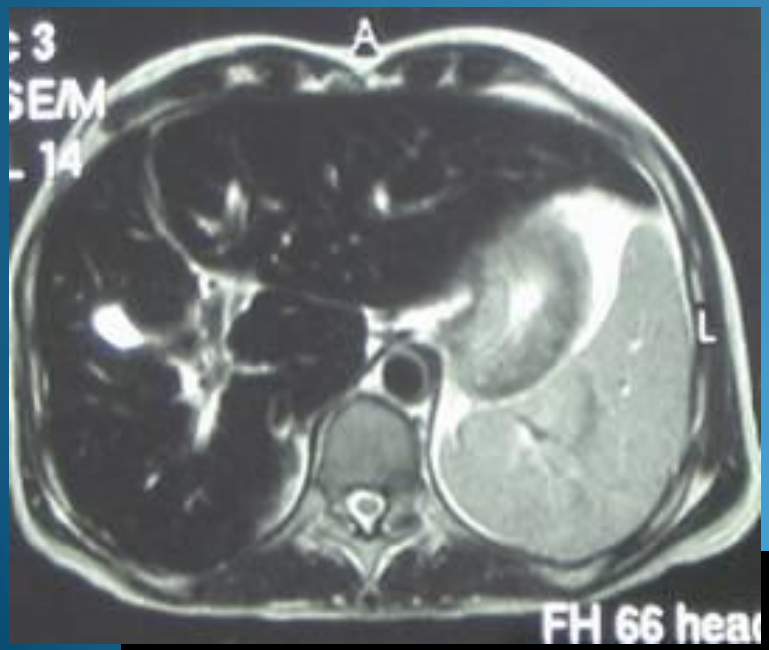
C. Hemochromatosis

- = excess iron deposition in various organs (liver, pancreas, spleen, kidneys, heart) leading to cirrhosis with portal htn. Males > Females 10:1. Iron is Dense on CT, Low signal on T2WI[hemosiderosis=increased iron deposition without organ damage]
- Primary hemochromatosis: ab. Increased absorption of dietary iron:
  auto recess; "Bronze DM"; Pancreas, heart, pituitary involved, less spleen; Iron deposited in hepatocytes (not Kupffer cells); increased risk of HCC. Tx: repeated phlebotomy
- Secondary hemochromatosis: seen in pts with hemolytic anemias requiring transfusions.(actually represents hemosiderosis):
  no pancreas involvement; iron deposited in Kupffer (and other RE cells); more splenic involvement; no risk of HCC; requires no txFatty infiltration of the liver is decreased density on CT. See reversal of liver-spleen density relationship (spleen normally 6-12 HU below liverCystic fibrosis: 30% have steatosis of liver, secondary to untxed malabsorpt., dietary def, meds. See signs of portal htn
  Sources: Dähhnert 5th p. 706-707
- MRI: liver and pancreas have low T2 signal; spleen is normal. Primary hemochromatosis (parenchymal): An iron overload disorder w/ func impairment. Incr Fe absorption by duo & jejun -> high plasma Fe, high transferring sat, & incr deposition of hemosiderin in cytoplasm of parenchymal cells of liver AND other organs.
- c. Iron overload from transfusion. MRI: liver and spleen low T2 signal; panc is normal. Secondary hemochromatosis (reticuloendothelial): Fe liberated fr RBCs & is deposited in mononuclear phagocyte system; organ func preserved. Examples: 1. high Fe intake (Medicinal Fe, Beer), 2. Multiple blood transfusions (ie. Anemic patients: thalassemia major, sideroblastic anemia), 3. Liver disease in alcoholic cirrhosis and s/p portocaval shunt.
- a. Gaucher's disease. A rare lysosomal storage dis cause by defic of glucosylceramidase resulting in accum of glucosylceramide in reticuloendothelial cells. Auto Recessive. 1:2500 incid. Incr Ashkenazi Jews. Liver replaced by Gaucher's cells (lipid laden macrophages) leading to cirrhosis & portal HTN. Imaging: liver fatty & cirrhotic. Hepatosplenomegaly. Bone:Erlenmyer flask modeling deform femurs, vert body collapse.
- (Gore & Levine, 1994 ed, 1978-82)

hemachromatosis







- **What are the T1 signal characteristics of pancreatic ductal adenocarcinoma pre- and post-contrast compared to normal pancreatic parenchyma?**
  a. T1:hyperintense / T1 with contrast: hyperintense
  b. T1:hyperintense / T1 with contrast: hypointense
  c. T1:hypointense / T1 with contrast: hypointense
  d. T1:hypointense / T1 with contrast: hyperintense

- A pancreatic ductal adenocarcinoma is most likely to have which of the following appearances on MRI relative to normal pancreatic parenchyma:
  - T1 T2
  - hypointense, hypointense
  - hyperintense, hyperintense
  - hyperintense, hypointense
  - hypointense, hyperintense

- A pancreatic ductal adenocarinoma is most likely to have which of the following appearances on noncontrast and enhanced CT relative to the normal pancreatic parenchyma:
  - Unenhanced Enhanced
  - isoattenuating, hyperattenuating
  - isoattenuating, isoattenuating
  - hypoattenuating, hypoattenuating

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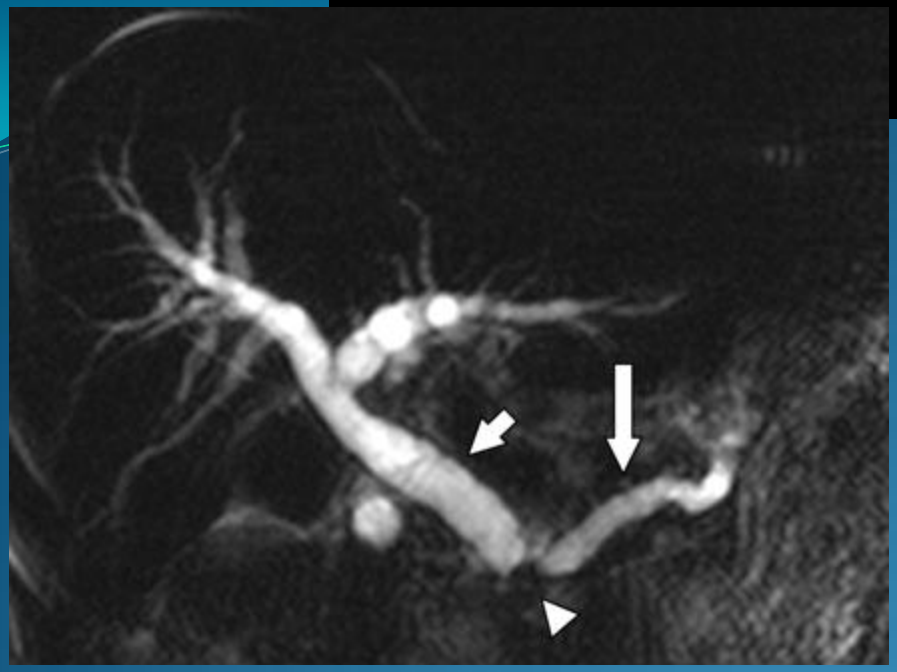
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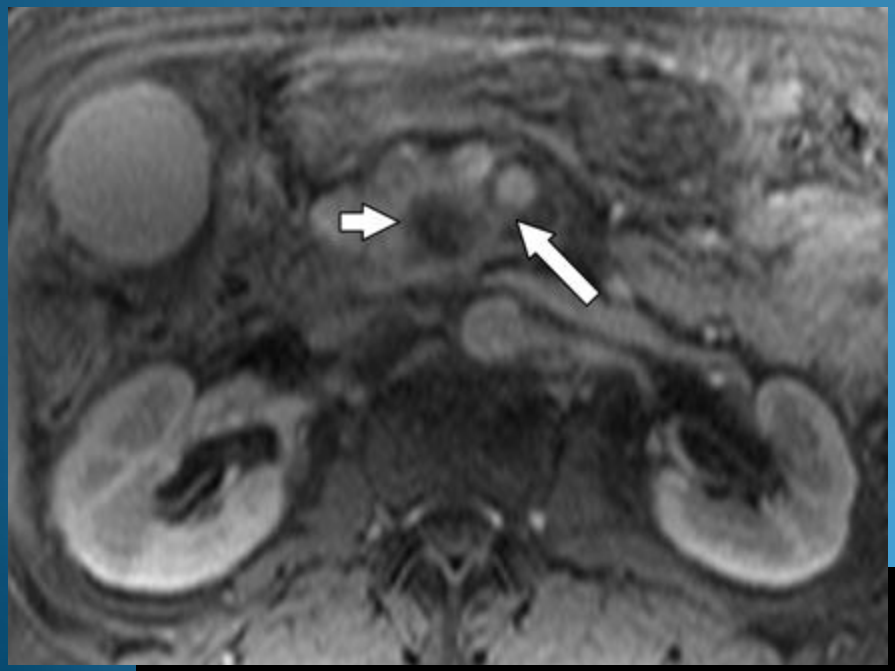
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  - isoattenuating, isoattenuating
  - **hypoattenuating, hypoattenuating**

- **C. T1: hypointense / T1 with contrast: hypointense**
- Hypointense lesion on fat-suppressed T1WI; diminished enhancement on dynamic contrast imaging.5th leading cause of cancer death in the US!; 62% in pancreatic head*Source: Dähnert 5th p. 724*

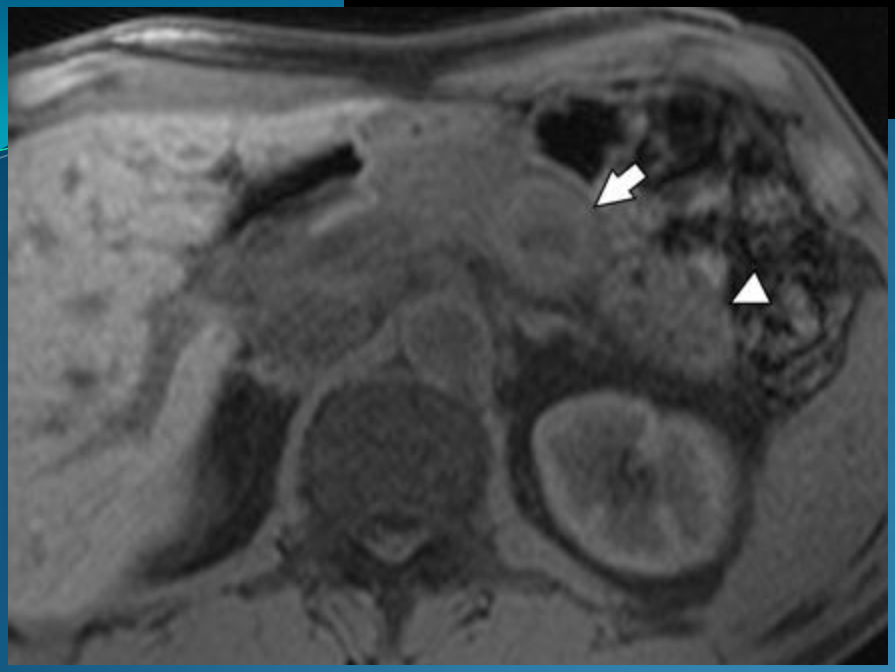
- ANSWER: A (*SFH – not sure for T2, found multiple studies saying isointense, hyperintense, and hypointense. I think hypointense on T2 is the best answer but probably this is a bad question)*
- Primary ductal adenocarcinoma of the pancreas tends to have signal intensity on T2-weighted images that is hypointense to isointense to normal pancreas. http://www.dimag.com/bodymri/pancreatic.jhtml
- Pancreatic ductal adenocarcinoma generally has a longer T1 than surrounding pancreatic tissue and has a T2 equal to or slightly longer than surrounding pancreatic tissue. Therefore, the tumor will typically be hypointense on T1 and iso-to-hyper intense on T2.

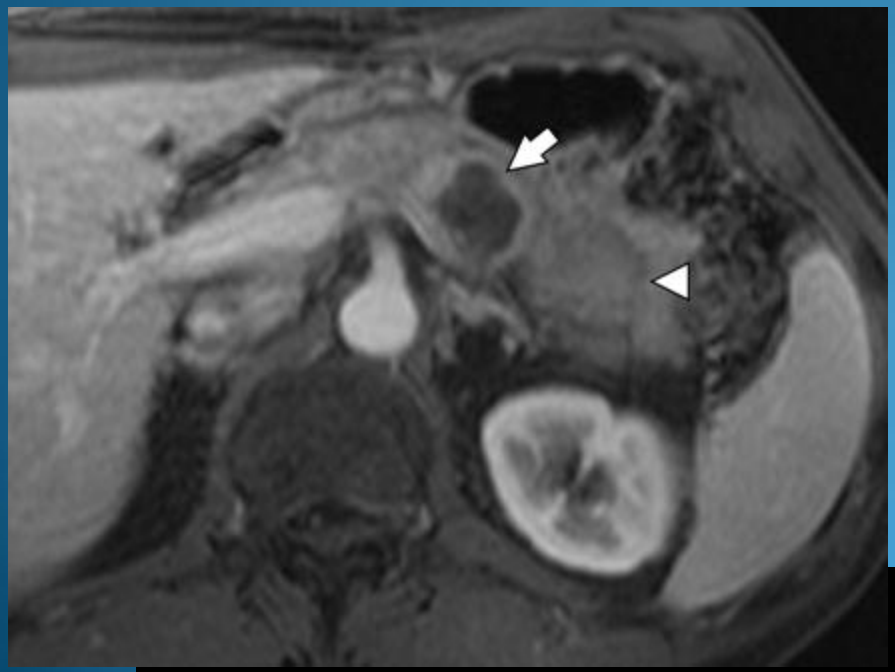
- **ANSWER: C**
- Pancreatic ductal adenocarcinoma is usually iso-to-hypoattenuating on non-contrast CT images and hypoattenuating on portal venous phase CT images. On delayed images (eg. 5 min), the tumor may be hyperattenuating due to retention of contrast.





- Coronal T2-weighted RARE MR cholangiopancreatography image shows dilation of common bile duct (*short arrow*) and pancreatic duct (*long arrow*) with abrupt termination at confluence of ducts (*arrowhead*). This **double duct sign** is highly suspicious for malignancy
- Axial late arterial-phase gadolinium-enhanced T1-weighted fat-suppressed gradient-recalled echo MR image shows 2.5-cm hypointense mass (*short arrow*) in head of pancreas responsible for double duct sign seen on MR cholangiopancreatography





- Axial unenhanced T1-weighted fat-suppressed gradient-recalled echo MR image at lower level than **C** shows mass (*arrow*) in body of pancreas.
- Axial gadolinium-enhanced T1-weighted fat-suppressed gradient-recalled echo MR image shows hypointense mass (*arrow*) suspicious for tumor in body of pancreas

- **Conjugated bile salts are resorbed where?**
  a. terminal ileum by active transport
  b. terminal ileum by passive diffusion
  c. jejunum by active transport
  d. jejunum by passive diffusion
  e. Colon

- Enterohepatic circulation of the bile salts is characterized by which of the following:
  - Active uptake in the jejunum
  - Active uptake in the distal ileum
  - Passive uptake in the distal ileum
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A. ileum by active transport

- Possible variant on this question: free bile acids (as in bacterial overgrowth) are absorbed in the jejunum.
  Source: Harrison's (14th ed.), 1726
- Enterohepatic circulation: Bile acids (cholic and chenodeoxycholic acid) are carboxylated steroid molecules derived from cholesterol and are detergent molecules responsible for promoting bile flow and secretion of phospholipid and cholesterol. Bile acids are secreted as taurine and glycine conjugates – 10% to 20% of excreted bile acid is deconjugated in intestine by bacterial action. Virtually all conjugated and deconjugated bile acids/ salts are reabsorbed through action of a sodium – bile acids cotransporter in the apical membrane of ileal enterocytes, and are returned to liver for uptake, reconjugation and resecretion. [Ref. Robbins] Lipids in diet (long chain triglycerides, phospholipids and cholesterol) undergo emulsification, lipolysis, and formation of micelles. Initial emulsification in stomach (gastric lipase), followed by lipolysis with formation of monoglycerides and fatty acids (pancreatic lipase) that form complex micelle with bile acids and biliary phospholipids. At enterocyte wall dissolution of micelle occurs with dietary lipids rapidly enter cytoplasm by passive diffusion. Bile salts from micelle remain outside cell membrane for solubilization of further lipids. Eventually the bile salts reach terminal ileum where almost 95% are reabsorbed and return to liver. [Ref. Gore & Levine]

- **What is the most common complication of ERCP?**
  a. perforation
  b. pancreatitis
  c. sepsis
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Pancreatitis

- Complications of ERCP: pancreatitis 5%; duodenal perforation; GI bleeding *Source: Primer 2nd p. 209.*
- Gore & Levine, Table 87-5 p. 1602 lists complications of ERCP: **Pancreatits 1%;** cholangitis 0.8%; drug side effects 0.6%; pancreatic abscess 0.3%; GI injury 0.2%; mortality 0.2%

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  a. splenic vein thrombosis
  b. portal hypertension
  c. Budd-Chiari syndrome
  d. other

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?Splenic Vein thrombosis? Or portal HTN

- *Primer* says " Isolated gastric varices is often caused by splenic vein obstruction and is most commonly secondary to pancreatitis or pancreatic carcinoma." p. 174
- But note these articles:
- Thus, most patients with isolated gastric varices have portal hypertension rather than splenic vein obstruction as the underlying cause.
  - *Isolated gastric varices: Splenic vein obstruction or portal hypertension?; Abdominal Imaging, 1989 UPENN*
- Isolated gastric varices identified in endoscopy can first strongly suggests the presence of liver cirrhosis with portal hypertension. Pancreatic diseases complicating with splenic vein obstruction is the second possible underlying etiology.
  - *Significance of isolated gastric varices among Chinese patients*
- Only a minority of isolated gastric varices are a result of splenic vein obstruction.
  - emedicine

- **During endoscopy of the esophagus, a sac-like structure is seen at anterior /lateral aspect, near cricopharyngeus muscle**
  a. Zenker's
  b. Killian-Jamieson diverticulum
  c. Lateral pharyngeal diverticulum
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B. Killian-Jamieson diverticulum

- Killian-Jamieson diverticulum: = lateral pharyngoesophageal diverticulum or lateral cervical diverticulum--Emerges in a **lateral or anterolateral** direction through a weak area in the anterolateral aspect of the pharyngoesophageal junction, just below the transverse portion of the cricopharyngeus muscle; small, with **narrow neck**, usually several mm in diameter; most found incidentally, rarely cause Sx; may be unilateral or bilateral; protrude through defect probably where inf. Laryngeal nerve and vessels pass *Eisenberg 3rd p. 121;. GI Case Studies p 148; Primer 2nd ed 154*
- Pharyngeal pouches: large **wide-mouth** bulges along lateral contours of the hypopharynx; common among elderly and wind-playing musicians; do not retain swallowed food *(Felson Gamuts 3rd p 447)*
- Zenker's Diverticulum: pulsion diverticulum; herniation through area of weakness at Killian's dehiscence; above cricopharyngeus, midline & **posterior** (C5/C6); should see barium-filled sac extending caudally behind, and usually to left of esophagus. Risk of perforation at endoscopy. *Dähnert 5th p. 866*
- Branchial cleft cyst: 95% arise from 2nd bronchial apparatus; located in parotid space near angle of mandible; history: usually of multiple abscesses unresponsive to tx; may insinuate between Internal and external carotid artery (pathognomonic)

- **The most common type of choledochal cyst**
  a. choledochocele
  b. diverticulum of CBD
  c. fusiform dilitation of CBD
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- Types of choledochal cysts:
  1. fusiform dilatation: CBD + CHD (~85%)
  2. diverticulum of extrahepatic ducts (1-3%) originating from CBD/CHD
  3. choledochocele (1-6%): cystic dilatation of distal CBD with herniation of CBD into duodenum (similar to ureterocele)
  4. multiple segmental cysts: in intra- and extra- hepatic ducts (19%)
  5. extrahepatic ducts only (rare)
  6. intrahepatic cysts = Caroli's disease Source: Dähnert pp 554, 575??
- See US Requisites pg 99

- 80-90% of all choledochal cysts; Todani type 1 choledochal cyst. Choledochal cyst = congenital cystic dilatations of any portion of the extrahepatic bile ducts, most commonly the main portion of the CBD. Pathogenesis (postulated): Anomalous junc of CBD & panc duct prox to duo papilla. Reflux of panc enzymes into biliary tree (d/t incr panc duct P & absent sphincter) leads to weaking of CBD wall. F:M = 3: 1. 60% before age 10 yrs.
- A. choledochocele (type 3). 5%. A protrusion of a dilated seg of CBD into the duo. Cystic bil dil w/in the duo wall.
- B/C. Caroli's dz (type 5): (v rare) sacular dilatations of intrahep ducts, stones, strictures, & communic hepatic abscesses.
- Type 2: 3%. extrahep supraduodenal diverticulum.
- Type 4: 10%. 4a: Fusiform & intrahepat cysts. 4b: Multi extrahepat cysts.

- **Which of the following is the most likely cause of a liver with increased attenuation on non-contrasted CT?**
  a. steatosis
  b. chemotherapy (e.g., cyclophosphamide)
  c. radiation
  d. amiodarone
  e. amyloid
  f. lymphoma

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D. Amiodarone

- : 37% Iodine by weight; affinity for accum. In liver; on CT: 95-145 HU (range of nl liver is 30-70 HU). It is the only antiarrhythmic drug without cardiodepressive effects, so is very popular sources: Dahnert 5th p 657
- Steatosis: fatty infiltration of liver = low density liver
  on CT see -reversed liver-spleen density relationship (spleen normally 6-12 HU below liver density); hyperdense intrahepatic vessels. source: Dahnert 5th p. 702
  Causes—Obesity (most commonly), alcohol, hyperalimentation, debilitation, chemotherapy (see below), steroids
- Radiation: increased attenuation from chronic hepatitis – no fatty infiltration (Dahnert 5th p. 713) [* the inclusion of this option may be an inaccurate recall, as there is a similar question from past years that lists amyloid as a possible choice]
- Chemotherapy: fatty / low-density liver (Dahnert 5th 702)
- Amyloid: hepatomegally, with regions of low attenuation + decreased contrast enhancement. Dahnert 5th p. 792
- Lymphoma: detection rate < 10% (usually autopsy) Dahnert 5th p. 718

- An immunocompromised patient presents with multiple “target” lesions in the spleen on CT. What is the most likely diagnosis?
  - Fungal microabscesses
  - PCP
  - Atypical mycobacterial infection
  - Lymphoma

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FUNGAL MICROABSCESSES

- CT: well-defined nonenhancing low attenuation lesions usually 5-10mm (up to 2 cm). On U/S "bull's eye" central bright echogenic surrounded by hypoechoic band. "Wheel within wheel" appearance is characteristic, & is like bull's eye but also has hypoechoic center d/t necrotic tissue w/ fungal elements. Candida > aspergillus & cryptococcus. Mainly in immunocompromised neutropenic pts. Sx:Fever & splenomegaly, clinical deterioration. Tx promptly or can often be fatal.
- PCP. CT: Enlarged spleen w/ focal hypoatten lesion, may enlarge & become calcified in rim-like or punctate fashion. Also: calc liver, kidneys, adrenals and lymph nodes, and pleural surfaces.
- Atypical mycobacterial infxn. CT: hepatic & splenic enlargement, diffuse jejunal wall thickening, & enlarged lymph nodes (RP & mesenteric) suggest MAI. 30% of pts w/ dissemin TB, & only 7% of pts w/ MAI have small focal splenic lesions.
- Lymphoma. Variety of CT appearances: homogen enlargement, solitary mass, multifocal lesions, diffuse infiltration. Lymphadenopathy with hypoatten splenic masses & splenomegaly suggests possibility of lymphoma.
- (Gore & Levine, 1994 ed, 2253-58 & 2278-82)



Fig. 2.—Case 3. Unenhanced CT scan shows almost complete calcification of spleen, several calcified lymph nodes, and scattered punctate calcifications in liver and left kidney.









- **Which is true regarding pancreatic adenocarcinoma?**
  a. attenuation lower than normal Pancreas on CECT
  b. typically hyperchoic to normal pancreas on US
  c. displaces normal vessels
  d. causes atrophy of pancreas proximal to mass
  e. well encapsulated on CT

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A. attenuation lower than pancreas on CECT

- **Dahnert 5th 724.**
- Hypoechoic on US (*Dahnert 5th p. 724*)
- causes atrophy **distally** (atrophy of body/tail in 20%)
- pancreatic adenocarcinoma grows in a fibrous or schirrous manner. It tends to grow along tissue planes, and replaces the normal tissues in the region. It does not grow into a well defined mass, but has poor margins. It also encases (rather than displaces) vessels [SMA, portal vein, etc.], which can make it non-resectable

  Primer 2nd p. 226; GI Case Review p. 12

- **A patient has intrahepatic and extrahepatic dilatations and strictures along with stricture of the sphincter of Oddi. Most likely diagnosis:**
  a. primary sclerosing cholangitis
  b. secondary sclerosing cholangitis
  c. ascending cholangitis
  d. recurrent pyogenic cholangitis
  e. Caroli's disease

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A. primary sclerosing cholangitis

- Rare, chronic dx of bile ducts; Characterized by patchy, progressive fibrosis of intra-, extra-hepatic ducts, or both (60%-90%)
  - Multiple segmental strictures involving the ***intrahepatic and extrahepatic*** bile ducts are the hallmark finding; outpouchings 24%. CBD always involved; 60% have ulcerative colitis, 5% have Crohn's
- Ascending cholangitis:
  - recurrent (sporadic) episodes of sepsis + RUQ pain.
  - Purulent material fills biliary ducts
  - charcot triad 70% (fever+ chills+ jaundice); 100% mortality if not decompressed
- Recurrent pyogenic (= Oriental) cholangitis: in the differential, but uncommon in the U.S. (see related question from 2002 GI)
- Caroli's disease: beaded appearance of intrahepatic ducts

Source: Dähnert 5th p. 689





primary sclerosing cholangitis



1. Typical diffuse, annular strictures of the intrahepatic ducts. The intervening ductal segments are relatively distensible, resulting in a "beaded" appearance.
2. Confluent strictures, several centimeters in length, involving the intrahepatic ducts and common hepatic duct. The diminished arborization of the intrahepatic ducts results in a classic "pruned-tree" appearance.

- **Oriental cholangiohepatitis is NOT associated with--**
  a. jaundice
  b. biliary stones
  c. biliary duct dilatation
  d. elderly orientals
  e. RUQ pain

- Clonorchis Sinensis infection is associated with:
  a. gallbladder cancer
  b. cholangiocarcinoma
  c. hepatocellular carcinoma
  d. biliary cystadenoma

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- Oriental cholangiohepatitis = recurrent pyogenic cholangitis
  Age range: **20 – 50 years** (*Dahnert 5th p. 689*)
- Characteristic features: OCH is characterized by recurrent cholangitis caused by bile stasis and stone formation proximal to biliary strictures.

  The pathogenesis of the stone formation and biliary abnormalities is incompletely understood. , endemic to S.E. Asia; recurrent attacks of fever, chills, abdominal **pain**, **jaundice**;
- The bile ducts are markedly abnormal, characterized by extrahepatic and intrahepatic ductal dilatation with focal areas of stricturing in the intrahepatic biliary tree.
  - *UpToDate*
- **B.** *Clonorchis sinensis* infection is a cause of Oriental cholangiohepatitis which is a predisposer to **cholangiocarcinoma**.

- Regarding gallbladder carcinoma which is **FALSE**:
  a. Intraluminal polypoid form is most common
  b. Usually presents in elderly females
  c. Poor prognosis
  d. Spreads by local invasion of adjacent liver
  e. Early lymphatic spread occurs to the retroperitoneal, right celiac, and pancreaticoduodenal nodes.

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A. Intraluminal polypoid form is most common- 20-25%

- Three patterns of findings are identified as follows:
  - In 50% of patients, a heterogeneous mass replacing the GB is present. The eponym "jam-packed" GB refers to filling of the entire lumen with tumor.
  - Focal or diffuse wall thickening is seen in approximately 25% of patients on CT scan and is often better appreciated on sonography. The thickened wall may show abnormally bright or persistent enhancement on infused CT scans.
  - In the remaining 20-25% of patients, a discrete intraluminal mass enhancing heterogeneously after IV contrast administration is visualized. Trapped stones within the mass occasionally may be seen. CT scan also may show biliary dilatation and metastases.
- b. Usually presents in elderly females- The male-to-female ratio is 1:3, The greatest incidence of GB carcinoma is in persons older than 65 years
- c. Poor prognosis- Patients with GB carcinoma have an overall mean survival rate of 6 months, and the 5-year survival rate is 5%.
- Spreads by local invasion of adjacent liver-
- Early lymphatic spread occurs to the retroperitoneal, right celiac, and pancreaticoduodenal nodes.
- Although uncommon, carcinoma of the gallbladder (GB) is the most common primary hepatobiliary carcinoma and predominantly affects older persons with long-standing cholecystolithiasis.

- **Meckel Diverticulum is remnant of what structure?**
  a. omphalomesenteric duct
  b. Müllerian duct
  c. Wolffian duct
  d. urachus

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  b. Müllerian duct
  c. Wolffian duct
  d. urachus

A. omphalomesenteric duct

- (= vitelline duct)Meckel's diverticulum is the most common congenital abnormality of GI tract (.3-3% of population); found within 30-90 cm of IC valve; on antimesemteric border Dahnert 5th 845
- - contains ectopic mucosa in 50% (gastric or pancreatic or bowel)
  - > 95% of GI hemorrhage have ectopic gastric mucosa
  - rule of 2s: in 2% of population; symptomatic usu. Before age 2; located within 2 feet of ICV; two inches long
  - Meckel scan > 85% sensitive, > 95% specific
- Mullerian duct: forms entire female genitalia except distal 1/3 of vagina; anomalies include uterine agenesis, hypoplasia, uterus didelphys, bicornuate uterus, etc.; degenerates in males.
- Wolffian duct: analog for vas deferens, seminal vesicles, epididymis; induces kidney devel.+ Mullerian dev. In females.
- Urachus: median umbilical ligament (remnant of allantois) sources: Primer 769; Dahnert 5th pp 750, 882, 976

- contains all layers of bowel wall (true divertic).
- Tc99m pertechnetate is taken up by gastric mucosa.
- (Gore & Levine, 1994 ed, 1002-4,1463)

- **Elderly male with severe abdominal pain and hematochezia. Plain film shows thickened folds of transverse colon. Likely cause?**
  a. pseudomembranous colitis w/ hx antibiotic use
  b. ischemic colitis
  c. Crohn's colitis
  d. Ulcerative Colitis

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  b. **ischemic colitis**
  c. Crohn's colitis
  d. Ulcerative Colitis

B. Ischemic colitis

- Ischemic colitis--best answer for information given:
  - Thumbprinting seen on plain film in about 20% of patients with ischemic colitis *(Eisenberg 3rd, p. 773; conflicts with Dähnert)*
  "In an older patient presenting with abdominal pain and rectal bleeding, the detection of multiple smooth soft-tissue densities protruding into the lumen of the bowel permits a provisional diagnosis of ischemia" *Eisenberg 3rd p. 773; GI Requ. pp 218, 232*
  - Age > 50 yrs, M = F.
  - precipitated by obstruction, thrombosis, trauma, idiopathic
- Pseudomembranous colitis: caused by overgrowth of Clostridium difficile in response to decrease in no intestional flora. Predisposed, among others, are pts on antibioic therapy - certainly in the differential here, but is "rarely associated with significant rectal bleeding..." *Eisenberg 3rd p. 779.*
  - thumbprinting may be most prominent in the transverse colon (18%), but it is usually generalized rather than segmental
- Crohns and UC: diseases of younger pts; UC would usually involve the **rectum**; Crohn's might show skip areas & SB disease.

- **Elderly male patient with diabetes has acute onset colicky abdominal pain and tarry stools. CT showing single loop of air dilated small bowel associated with a segment of straightened, thick-walled small bowel. What is the likely diagnosis?**
  a. short segment (focal) ischemia
  b. generalized ischemic colitis
  c. Regional enteritis (Crohn's)
  d. *C. difficile* colitis

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A. short segment (focal) ischemia

- Caused by acute occlusive SMA embolus (> 50%); crampy → continuous abdominal pain; gross rectal bleeding; in patients with cardiac disease predisposing to embolization
  - any segment of small bowel
  - CT: circumferential bowel wall thickening
  - focal or diffuse bowel dilatation from interruption of peristaltic activity
- Possible bowel dilatation proximal to the ischemic segment of the bowel
  - *emedicine*

- **Regarding Crohn's disease**

  a. commonly affects gastroduodenal regions

  b. commonly affects jejunum

  c. frequently affects colon and small bowel simultaneously

  d. asymmetric mural involvement

  e. continuous involvement

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D. asymmetric involvement

- Crohn's disease is characterized by **discontinuous** & asymmetric involvement of entire GI tract ("mouth to anus"). It affects the stomach in 1-2%
  - Colon in 22-55% = granulomatous colitis
  - Small bowel (80%, TI) = regional enteritis
  - TI (alone/ in combo. 95%); Jejunum / ileum (15-55%)
  - Affects duodenum in 3-10% [*Source: Dahnert 5th pp 809]; Primer 2nd 184-185*

- **Most common cause of colonic-vesicular fistula**
  a. diverticulitis
  b. IBD
  c. Crohn
  d. Ebola cystitis

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A. Diverticulitis

- Bladder fistulas: types and common causes
  - **vesicoenteric**:
    - diverticulitis (most common),Crohn's, ca
  - vesicovaginal: surgery, catheters,ca.., rads
  - vesicocutaneous: trauma, surgery
  - vesicouterine: C-section
  - vesicoureteral: hysterectomy
  - *source: Primer 2nd p 285*

- **30 y/o female with pedunculated mass in the ileum**
  a. lymphoma
  b. adenocarcinoma
  c. carcinoid
  d. leiomyosarcoma
  e. Lipoma

- A 30 year old man undergoes small-bowel follow-through which demonstrates a pedunclated mass in the terminal ileum. The most likely diagnosis is:
  a Adenoma
  b Inflammatory fibroid of the small bowel
  c Lymphoma
  d Carcinoid

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- **E. Lipoma**
- Lipoma is the 3rd most common benign tumor of the SB (after leiomyoma and adenoma); most found in TI and IC valve area; arise in submucosa but protrude into lumen; pedunculated lipomas can be assoc. with intussusception.
  source: Eisenberg pp 484-8; Dahnert 840
- lymphoma of SB – probably better answer than lipoma: arise from Peyer's patches (deposits of lymphoid tissue, which are more concentrated in the ileum); among the most common malig. Tumors of the SB, but somewhat less common than adenocarcinoma.
  - location: DISTAL SB (ileum>jejunum> duodenum- 2%)
  - types: single/multiple polypoid mucosal masses; endoexoenteric mass; infiltrating with plaquelike wall involvement
  source: Dahnert 5th 841-842
- Adenocarcinoma of SB: 2nd most common primary SB malignancy (25%): location: PROXIMAL SB (duodenum-50% > jejunum> ileum 10%);
  - presents as: annular stricture (60%); lobulated ovoid polypoid sessile mass (41%); ulcerated mass (27%); rarely, present as pedunculated polyp UNLIKELY IN A 30 Y/O PATIENT
- *sources: Dahnert 5th p 654; Eisenberg p 486,Alimentary Tract Radiology 3rd pp 972*
- Leiomyosarcoma: Location: ileum> jejunum> duodenum; Usually >6cm in size; Nodular mass: intraluminal (10%),pedunculated (5%),intramural (15%), chiefly extrinsic (66%).
  Source: Dahnert 4th p 698

- **Adenomas** – Proliferating epithelial neoplasms, 40% villous, rest tubular or tubulovillous; small (1 to 3 cm), smooth or slightly lobulated. On barium sessile or pedunculated intraluminal defects. Usually solitary but may be multiple in with polyposis syndromes. Adenomas are the commonest tumors of small bowel and account for 25% benign small intestinal tumors (Robbins Pathology Pg. 827) However according to Gore & Levine, AFIP and Dahnert – leiomyomas (now classifed as GIST) are the most common benign small bowel tumors and have a high predilection for jejunum. Most adenomas occur in 2nd duodenum. Malignant changes are likely with large, villous adenomas. **Inflammatory fibroid polyps** – uncommon and are encountered in elderly patients and occur almost always in the ileum. Usually solitary and composed to fibrous stroma with diffuse inflammatory infiltrate. Barium shows smooth, rounded mass in distal small bowel. **Lymphoma** – Primary or secondary NHL; secondary GI involvement in 50% patients (stomach > small bowel > colon). Patterns on radiology (i) multiple nodular defects, (ii) infiltrating form, (iii) polypoid form, (iv) endoexoteric form with excavation and fistula formation and (v) predominately mesenteric invasive from with extraluminal mass. **Carcinoids** – malignant neoplasms in slow motion, appendix commonest site followed by terminal ileum arise from the neural crest, invasion into mesentery incites an intense fibrotic reaction. **UGI** - small smooth submucosal mass (usually <2 cm, if >2 cm 85% chance of metastasis) impinging eccentrically on lumen, angulation + kinking of loops leading to obstruction is diagnostic; spiculated / tethered appearance of mucosal folds due to desmoplastic reaction. **CT** – calcification in mesenteric metastasis is 50%. [Ref. Gore & Levine]
- Inflammatory polyps are uncommon and seen in elderly patients. Pedunculated lesions are not common in carcinoid or lymphoma (lymphomatous polyposis is a rare form that includes lesions of follicular mantle cell origin). Hence adenoma is the most likely the correct answer – it is statistically the commonest of the above tumors and may be pedunculated; also is usually an incidental finding.

- Primary small bowel tumors are rare, occurring in 1 in 100,000 people, and making up only 5-6% of gastrointestinal tumors. Benign and malignant tumors occur with equal incidence unless the patient is symptomatic, making a malignant mass three times more likely. The most common location is the ileum (41%) followed by the jejunum (36%) and duodenum (18%). The major malignant tumors in decreasing order of incidence are carcinoid, adenocarcinoma, lymphoma, gastrointestinal stromal tumor, vascular malignancy and fibrosarcoma. Their radiographic appearance ranges from pedunculated to extamural masses. Metastatic disease to the small bowel, is relatively common. Three mechanisms of spread are known: intraperitoneal seeding, hematogenous, and direct extension. Common primaries include melanoma, lung, colon, pancreas, breast and ovary. Malignant melanoma is the 6th most common cancer in the USA and makes up 1% of cancers, however, its rate of increase is estimated at 3.9% per year. It arises from melanocytes derived from neural crest cells with sites of primary occurrence including skin, mucous membranes (oral, anal mucosa), leptomeninges and the eye (uvea). Metastasis may occur in any location and most commonly are found 2-5 years after initial diagnosis. The most common sites are the lungs, liver, brain, bones, adrenals, GI tract and spleen. Metastasis to the GI tract usually presents as abdominal pain and/or bleeding with up to 50% occurring in the small bowel followed by colon (20%) and stomach (up to 20%). The presence of GI metastasis portends a poor prognosis. 30-40% of patients with melanoma succumb to their disease. The use of PET scanning in melanoma is limited for detecting primary disease but is advantageous in detection of metastatic disease, having 90% sensitivity and 92% specificity.

- **What are typical esophogram findings of HIV infection of esophagus?**
  a. shaggy mucosa
  b. plaques
  c. Giant ulcers
  d. Cobblestoning

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- HIV Esophagitis: One or more giant (> 1cm) flat ulcers (esp. at time of seroconversion); satellite ulcers may be present;
  - indistinguishable from CMV esophagitis. Dahnert 5th p. 823.

- Herpes simplex: abnormal motility; small ulcers (initially blisters), < 5mm
- Candidiasis: Most common cause of infectious esophagitis
  - plaquelike, reticular; abnormal motility
  - also "Cobblestone" and/or "Shaggy" appearance, esp. fulminant candidiasis (as in HIV)
- This is a very popular topic, seen in various forms on many old writtens *
- Other sources: Dahnert 5th 821; Eisenberg 3rd p 58

- HIV esophagitis is usually manifested on esophagography by the development of one or more giant (>1cm), flat ulcers, in the mid or distal esophagus, sometimes associated with small, satellite ulcers. The ulcers may appear in profile or en face as ovoid, elongated or diamond-shaped collections of barium, often suurounded by a radiolucent rim of edema. These HIV ulcers are therefore indistinguishable radiographically from CMV ulcers in the esophagus. Data suggest that most giant ulcers in HIV+ patients are caused by HIV rather than CMV. In contrast to CMV ulcers, HIV ulcers in the esophagus may heal spontaneously or may respond to treatment with steroids. Endoscopic biopsy specimens and viral cultures are required to distinguish HIV from CMV ulcers.
- Gore, Levine. Textbook of Gastrointestinal Radiology, 2nd edition, 358.

- **Gastroesophageal reflux is associated with all except:**
  a. thickened longitudinal folds
  b. pseudodiverticulae
  c. plaque-like lesions
  d. aperistalsis in lower esophagus
  e. granular appearing mucosa
  f. Stricture

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plaque-like lesions

- GI reflux: earliest findings on Xray = superficial ulcerations, granular / finely nodular folds
  - more severe disease = widening and coarsening of esophageal folds; nonperistaltic waves in distal esophagus; segmental esophageal narrowing (edema/spasm/stricture)
  - esophageal intramural pseudodiverticulosis = dilated excretory ducts of deep eophageal mucosal glands--in 90% assoc. with any severe esophagitis (most often reflux / candida) Dahnert 5th 819
  - Stricture may be a consequence of chronic reflux (Barrett's)
- Plaques are associated with Candida esophagitis sources: Dahnert 4th pp 680,2,3; Primer p 154; Dahnert 5th p. 822
- Spontaneous grastroesophageal reflux can be demonstrated with barium in 20 to 35% patients with reflux esophagitis. It is also seen on barium studies in 40% asymptomatic volunteers. Radiographic findings: Abnormal motility – 25 to 50% manifested by decreased or absent primary peristalsis and increased frequency of nonperistaltic contratctions. Mucosal nodularity – granular or finely nodular appearance in distal third or half of thoracic esophagus; occasionally associated with plaque-like lesions of Candida esophagitis and pseudomembrane formation. Ulceration – shallow ulcers and erosions or solitary "marginal" ulcers may be seen in the distal esophagus or gastroesophageal junction. Thickened folds – thickened longitudinal or transverse folds may be seen. Longitudinal folders wider than 3 mm are abnormal while physiologic transverse esophageal folds are transient and only 1 to 2 mm thick. Inflammatory polyps – smooth, ovoid or club-shaped in the lower esophagus with no malignant potential. Intramural pseudodiverticulosis – dilated excretory ducts of deep mucous glands in esophagus, associated with Candida (40%), diabetes (20%) and alcoholic (15%); 90% patients have associated strictures – most frequently in upper third. Distal peptic strictures with intramural pseudodiverticulosis due to chronic reflux esophagitis have also been reported. Perforation and diverticulitis forming peri-esophageal abscess possible. [Ref. Gore & Levine]

esophageal reflux pseudodiverticulosis

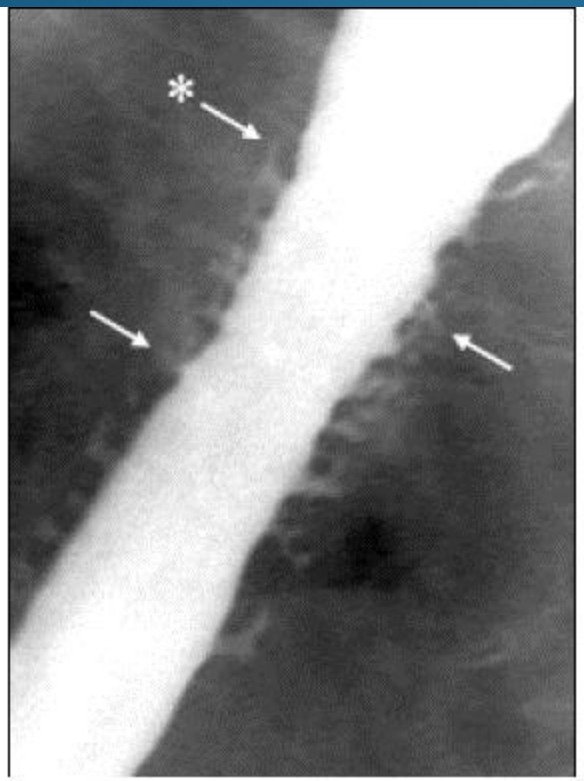


Figure 1: Single-contrast esophagogram reveals moderate stricture in the upper esophagus. Multiple flask-shaped outpouchings are found in the esophageal wall. Tiny collections of barium are found outside the esophageal wall that do not communicate with the lumen (arrows). Some of the pseudodiverticula show thin interconnecting intramural tracks (star).

- The etiology of EIP remains unknown, however current data suggests that pseudodiverticulosis is not a primary disease of the esophagus, it is much more a consequence of chronic irritation by different causes like esophageal reflux, diabetes or chronic alcoholism.[3],[4]

- **Esophageal Intramural Pseudodiverticulosis: a Reevaluation**
- **Abstract**

- Esophageal intramural pseudodiverticulosis is an unusual condition manifested by tiny flask-shaped outpouchings in the wall of the esophagus. The condition was diagnosed in 21 (0.15%) of 14,350 patients undergoing radiologic examinations of the esophagus at our hospitals. The pseudodiverticula were detected only by single-contrast technique in five of 18 patients (28%) who underwent both single- and double-contrast examinations. Thus, thin, low-density barium seems to enter these structures more readily than the high-density barium used for double-contrast esophagography. While most patients reported in the literature have diffuse or segmental pseudodiverticulosis associated with high esophageal strictures, the majority of our patients (11 (52%) of 21) had isolated involvement of the distal esophagus with 10 or fewer pseudodiverticula in the region of a peptic stricture. Other associated conditions included Candida esophagitis, herpes esophagitis, and squamous cell carcinoma of the esophagus. **Our experience suggests that pseudodiverticulosis usually represents a sequela of reflux esophagitis**, although the reason that so few patients with esophagitis develop this condition is unclear.

- **Which is least likely to metastasize to the esophagus?**
  a. melanoma
  b. Kaposi's sarcoma
  c. Carcinoid
  d. Leiomyosarcoma
  e. Breast

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C. Carcinoid

- Mets to esophagus: melanoma, lymphoma, leiomyosarcoma, stomach, lung, breast *Dähnert 4th p 626; Dähnert 5th p. 818.*
- Kaposi now considered asystemic multifocal progressive tumor of the GI tract. Visceral involvement thought to be an expression of the multicentric potential of the tumor, rather than metastatic dissemination. "Infrequent **esophageal involvement** appears as nonspecific single or multiple polypoid filling defects" *Eisenberg p 104; see also GI Requ. p. 258.*
- Carcinoid is said to metastasize to lymph nodes, liver, lung, and bone (not esophagus); given this & the choices, it is probably the best answer.

Carcinoid tumors of the esophagus are extremely rare. So far, only five cases have been reported in the English literature (2-6). The present patient is only sixth case in the literature and the first being reported from India. Due to the rarity of these lesions, they practically never enter into the differential diagnosis of esophageal malignancies. In general, carcinoid tumors are seen at

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Primary malignant carcinoid tumor of the esophagus

- **Which of the following does not cause gastric ulcers?**
  a. Zollinger-Ellison
  b. Aspirin
  c. H. pylori
  d. Ménétrier dx

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  b. Aspirin
  c. H. pylori
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D. Ménétrier's Disease

- Menetrier Dx: = Giant mucosal hypertrophy; characterized by excessive mucus production and triad of:
  - giant mucosal hypertrophy
  - Hypoproteinemia
  - hypochlorhydria (**decreased or absent** acid output in 75%)
- There is also gastric pain (gastritis) and a possible association with gastric carcinoma *Eisenberg 3rd p. 234; Gore & Levine*
  *[** Dähnert 5th p. 847 cites an association with gastric ulcers, however, review of several GI imaging texts suggests that Ménétrier's is rarely, if ever, associated with gastric ulcers; the other choices clearly are **]*
- Gastric ulcers: benign gastric ulcers = 95% of all gastric ulcers;
  path: disrupted mucosal barrier (**H. pylori**)
  multiple in 2-8%, esp. in pts. on **aspirin** (*source: Dahnert 4th p 687)*
- Zollinger-Ellison: = PUD assoc. with marked hypersecretion of gastric ulcer + non-b islet cell tumor of pancreas. cause:
  1. gastrinoma (90%) =non-beta islet cell tumor with continuous gastrin production
  2. pseudo Z-E syn=Cowley Syn=antral G-cell hyperplasia (10%)
  Location: Duodenal bulb (65%) + **stomach (20%)**; Near lig of Treitz (25%); C-loop (5%); Distal esophagus (5%)
  Source Dahnert 4th p 720-1

- Which is NOT associated with delayed gastric emptying?
  - diabetes
  - hypothyroid
  - morphine
  - ZES

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  - diabetes
  - hypothyroid
  - morphine
  - **ZES**

- Zollinger-Ellison Syndrome results from hypersecretion of gastrin which promotes GI motility.
- Delayed gastric emptying occurs in diabetics as a result of autonomic dysfunction (similar to peripheral neuropathies). With morphine (and similar opioids) result in decreased gastric emptying. Vagal tone increases rates of gastric emptying, and therefore vagotomy would delay gastric emptying. Hypothyroidism is also associated with delayed gastric emptying.
- (http://www.niddk.nih.gov/health/digest/summary/rapidem/rapidem.htm)

- **Which of the following causes the greatest amount of pancreatic secretions?**
  a. gastrin
  b. secretin
  c. cck
  d. trypsin

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- **Which of the following is most likely to be hypoechoic on US?**
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  b. breast mets
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A. Lymphoma

- Lymphoma is classically hypoechoic or anechoic due to the homogeneous cell population & paucity of of acoustic interfaces.
- Hyperechoic mets to the liver tend to arise from the colon
  - Echogenic liver mets:
    colon cancer (municous adenoca) 54%; hepatoma 25%; treated breast ca 21%.
    - Dähnert p. 597
  - Hypoechoic liver mets:
    lymphoma 44%; pancreas 36%; cervical ca 20%; lung (adenoca)
    - Dähnert p 507:

- **Which metastatic liver lesion is most likely to be hypervascular?**
  a. breast
  b. colon
  c. bronchogenic carcinoma
  d. pheochromocytoma

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  b. colon
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  d. pheochromocytoma

D. Pheochromocytoma

- *Hyper*vascular liver metastases
  - "**CHIMP**"
    - **C**arcinoid, **H**ypernephroma, **I**slet cell carcinoma, **M**elanoma, **P**heochromocytoma
    - also thyroid, choriocarcinoma, ovarian, sarcomas
- *Hypo*vascular liver metastases:
  - Stomach, **colon**, pancreas, **lung**, **breast**

Dähnert 5th p. 720-721

- **What is sincalide:**
- **a. Octreotide peptide of CCK**

- **A patient has ulcers in the ileum on mesenteric border with sacculations on the antimesenteric border. Most likely dx:**
  a. Crohn
  b. Yersinia
  c. TB
  d. Ischemia

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A. Crohn's Disease

- See pseudodiverticulae = pseudosacculations = bulging areas of normal wall opposite scarred wall on antimesenteric side of SB. **No other pathology will show this type of appearance**
  Source: Dähnert 5th p 809, ACR TF, GI, case 515
- TB: Most commonly affects ileocecal area (80-90%)
  Rigid cone-shaped cecum
- Yersinia: Can resemble Crohn's ileitis. Fold thickening, aphthous ulcers,coarsened mucosal surface, and inflamm. nodules are usual. Deep ulceration is unlikely; disease is self-limited.
- Ischemia: thickened folds, thumbprinting on mesenteric borderSources: *Dahnert 4th p 670; ACR Learning File, GI, cases 514,515*

- **Which is NOT true regarding pancreatitis?**
  a. fluid collection often seen with acute pancreatitis
  b. focal involvement is commonly seen in acute pancreatitis
  c. gallstones are commonly associated with chronic pancreatitis

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- Acute pancreatitis most often occurs secondary to ETOH or gallstones. Chronic pancreatitis causes include ETOH, hyperparathyroidism, hyperlipidemia, genetic.
- Fluid collections (formerly called phlegmons) are collections of enzyme-rich pancreatic fluid that occur in 40% of patients.
- Acute pancreatitis most often causes diffuse or focal enlargement of the pancreas secondary to inflammation and edema.
  Source: GI Requisites 2nd pp 142-3

- Question about pancreas divisum and the cause of resultant pancreatitis (not well remembered)
  a. stenosis of duct of Santorini
  b. minor papilla implicated in cause of pancreatitis- theoretically this one.
  c. predisposed to obstructing calculi
  d. others not remembered

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- relative obstruction to pancreatic exocrine secretory flow through the minor duct and minor papilla can result in pancreatitis in a small number of patients with pancreas divisum (with stenotic minor papilla)
- In pancreas divisum, the ventral and dorsal pancreatic ducts fail to fuse in utero, resulting in drainage of the bulk of pancreatic juice (80-95%) via the duct of Santorini through the relatively small minor papilla
- In patients with pancreas divisum, pancreatic history has demonstrated changes of chronic pancreatitis in the dorsal duct distribution and normal parenchyma in the ventral duct distribution. The etiology of stenosis of the accessory papilla is not identical to that of the clinical entity of stenosis or papillitis of the ampulla of Vater. **Relative stenosis of the minor sphincter is believed to occur because, as an outlet, it is too small to accept the exocrine drainage secretions from most of the adult pancreas. The slowly developing resistance to increased ductal pressure as the pancreas grows ultimately cannot be tolerated and pancreatitis ensues.**
- Pancreas divisum is a failure of the dorsal and ventral pancreatic ducts to fuse during embryogenesis. Probably a variant of normal anatomy, it occurs in approximately 5% of the population. In most cases, this variant may actually protect against gallstone pancreatitis. Although controversial, the presence of stenotic minor papillae and an atretic duct of Santorini are additional risk factors that together contribute to the development of acute pancreatitis through an obstructive mechanism.

- Facts regarding pancreas divisum include:
- a. stenotic minor papilla is the cause of pancreatitis
- b. dorsal segment drains into the major papilla
- c. dorsal pancreatic duct drains through the minor papilla
- d. obstruction of the main pancreatic duct is most often the cause of pancreatitis
- e. increased incidence of pancreatic carcinoma

- Facts regarding pancreas divisum include:
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- b. dorsal segment drains into the major papilla
- **c. dorsal pancreatic duct drains through the minor papilla**
- d. obstruction of the main pancreatic duct is most often the cause of pancreatitis
- e. increased incidence of pancreatic carcinoma

- **Which is not associated with colon cancer?**
  a. breast cancer
  b. prostate cancer
  c. bronchogenic carcinoma
  d. ovarian cancer

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Prostate

- Breast, Colon, and ovarian cancer are all clearly associated; *Dähnert 5th p. 804* – "…personal History of ovarian / endometrial / breast cancer… [are associated with Colon CA]" In fact, "early colorectal cancer" is listed as increasing the risk of ovarian cancer by 3.5x.A clearly listed association of either prostate or bronchogenic cancer with colon cancer was not found. However, *Dähnert 5th p. 939* lists animal fat intake as a risk for prostate cancer; as this is also a well-known risk factor for Colon cancer, they are probably associated.Note that risk factors for Bronchogenic cancer include cigarette smoking, radon, asbestos, uranium, arsenic, and chlormethyl ether *[Dähnert 5th p. 467]*

2001

- **Which is most sensitive for bowel malrotation?**
  a. duodenojejenal junction is inferomedially positioned
  b. cecum is in the right upper quadrant
  c. jejenum is to the right of the spine
  d.

2001

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A. duodenaljejunal junction is inferomedially positioned

- (= Ligament of Trietz)"Location of Lig. Of Treitz is key to making diagnosis of midgut malrotation. The ligament is located inferiorly and medial to its expected position. In cases of complete malrotation it is located to the right of the spine. The position of the cecum is variable but in complete malrotation, it is located largely in the left abdomen."
  Source GI Requisites p 93

- **Regarding the cricopharyngeus muscle, which is true?**
  a. located at the C1-C2 level
  b. indicates the inferior extent of the cervical esophagus
  c. is located just inferior to the mouth of a Zenker's diverticulum
  d. posterior impression on the esophagus is an abnormal finding

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  d. posterior impression on the esophagus is an abnormal finding

- From the *Primer 3rd p. 160*: "[Zenker's] … is located at Killian's dehiscence (above cricopharyngeus at fiber divergence with inferior pharyngeal constrictor)."
  - The mechanism of formation for a Zenker's is premature closure of the cricopharyngeus resulting in increased intraluminal pressure. *Dähnert 5th p. 866*.A Zenker's is located at C5/C6, which means the cricopharyngeus is at least that low.The cervical esophagus extends from the lower border of cricoid cartilage to suprasternal notch. *GI Req. 2nd p. 20; Brant & Helms 2nd p. 713*.

- **Regarding esophageal leiomyomas--**
  a. Often bleed
  b. Are the most common neoplasm of the esophagus
  c. Occur in mid to distal esophagus
  d. obstruct the esophagus

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Esophageal Leiomyomas

- Site: lower 2/3 of esophagus. *Dähnert 5th p. 839-840.*
- the majority of esophageal neoplasms, excluding lesions arising at the esophagogastric junction, are squamous cell carcinomas. *B&H 2nd p. 332.*
- but leiomyoma is the most common benign submucosal tumor of the esophagus.
  - Symptoms are commonly dysphagia, odynophagia, and dyspepsia. Obstruction is uncommon.
  - Only calcifying tumor of the esophagus.
- *FD Morin, PM Bret, P Bret, and MJ Palayew*
  General case of the day. Fibrovascular polyp of the esophagus
  RadioGraphics 1992; 12: 845-847.

Eighty percent of esophageal neoplasms are malignant, and 20% are benign. Benign

- **Which of the following is *false* regarding ultrasound features of bowel cysts?**
  a. They more common in the ileocolic region
  b. They may not communicate with the bowel lumen
  c. Muscular layer is more hyperechoic than the mucosal layer
  d.

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  d.

- A “muscular rim” sign is seen in 47% of duplications cysts (= echogenic inner mucosal lining & **hypo**echoic outer rim). ***Dähnert 5th p. 815***.
  - Commonly seen in the **ileum (30-33%)** > esophagus (17-20%) > colon (13-30%) > jejunum (10-13%) > stomach (7%) > pylorus (4%) > duodenum (4-5%)
  - 15% of pediatric abdominal masses are GI duplication cysts
- Located on mesenteric aspect of alimentary canal
  - frequently (but not always) communicate with the lumen of the adjacent gut
  - gastric and pancreatic tissue are the only ectopic tissues of clinical importance

- **Screening for colon carcinoma should be performed in--**
  a. Everyone after 35 years of age
  b. Everyone after 40 years of age
  c. Everyone after 50 years of age
  d. Everyone after 60 years of age

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  a. Everyone after 35 years of age
  b. Everyone after 40 years of age
  c. **Everyone after 50 years of age**
  d. Everyone after 60 years of age

- For persons > 50 years of age: annual fecal occult blood test + sigmoidoscopy / BE every 3 to 5 years (per American Cancer Society)Screening recommendations: as/more effective than mammographic screening
- for first degree relatives of patients with colon cancer screening should start at age 40. ***Dähnert 5th p. 804***.

- **Clonorchis sinensis most commonly associated with--**
  a. Gall Stone
  b. Cholangiocarcinoma
  c. Sclerosing cholangitis
  d.

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- Extrahepatic cholangiocarcinoma (65%) causes stenosis or obstruction of the common bile duct in most (95%) cases and presents as an intraductal polypoid mass in 5%.
  - Predisposing conditions include choledochal cyst, ulcerative colitis, Caroli's disease, Clonorchis sinesis infection, and primary sclerosis cholangitis.
  -The tumor may be infiltrative, desmoplastic, and small, making imaging detection was well as needle biopsy difficult. Abrupt stricture with thickening of duct wall may be the only findings. Cross sectional imaging is used to detect adenopathy and hepatic metastases.
  -Prognosis is poor, with less than 30% resectable.
  Dähnert 5th p. 686, 698.

- **Pulsatile flow in portal vein with enlarged liver--**
  a. Budd chiari syndrome
  b. Cirrhotic liver
  c. CHF
  d.

- **Pulsatile flow in portal vein with enlarged liver--**
  a. Budd chiari syndrome
  b. Cirrhotic liver
  c. CHF
  d.

C. CHF

- Def.: waveform pulsatility with > 2/3 change from peak to minimal velocity

  1. CHF: in cases of passive congestion associated with right-sided cardiac failure and/or tricuspid regurgitation, the pulsatility of right atrial and systemic hepatic venous flow is transmitted by the congested hepatic sinusoidal bed to the portal side of the circulation
  2. Hepatic artery-portal vein fistula
  3. Arteriovenous shunt in cirrhosis
  4. Portal-to-hepatic vein fistula
- ***Dähnert 5th p. 661***; *see also* *www.biosound.com*
- *Radiology*

The Pulsatile Portal Vein in Cases of Congestive Heart Failure: Correlation of Duplex Doppler Findings with Right Atrial Pressures[1]

- **Pt with very large cholangiocarcinoma at the hepatic ducts confluence--- what is the cause of atrophy of the left lobe of the liver--**
  a. portal vein compression
  b. biliary ductal dilatation
  c. hepatic artery compression
  d. hepatic vein compression

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  b. biliary ductal dilatation
  c. hepatic artery compression
  d. hepatic vein compression

A. biliary ductal dilatation.

- This is the **Klatskin tumor**. Per the *Duke Case Review* (p. 151),
  "…there is marked biliary dilatation above the obstruction and hepatic atrophy of the segments involved…"
  - also note that biliary obstruction by other causes (e.g., stones) can cause atrophy.
- "Focally stenotic or papillary cholangiocarcinomas often cause segmental bile duct dilatation and may induce lobar atrophy if the location of the tumor is central…" *Gore and Levine p. 1719*.
- On the other hand, portal vein occlusion (e.g., chronic portal vein thrombosis) does not seem to cause liver atrophy. ***Dähnert 5th p. 686, 736.***

- **Which statement is false about hepatic adenoma?**
  a. increased incidence of hemorrhage
  b. pt present with pain
  c. core biopsy can reliably differentiate between adenoma and carcinoma
  d. associated with birth control pills
  e. characteristic appearance on 99mTc-sulfur colloid scans

- **Which statement is false about hepatic adenoma?**
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  c. core biopsy can reliably differentiate between adenoma and carcinoma
  d. associated with birth control pills
  e. characteristic appearance on 99mTc-sulfur colloid scans

C. core biopsy can reliably differentiate between adenoma and carcinoma

- This is probably the "best" answer, especially given the word "reliably," and seems to be the consensus on old exams
  - adenoma shows benign hepatocytes, and *well-differentiated* HCC can appear similar. ***Dähnert 5th p. 714***
- [concerning anabolic-steroid associated HCA] "...this is due to its distinctive histologic appearance, which often resembles that of hepatocellular carcinoma..."; "Microscopically, the cells of HCC resemble normal liver cells and it is often difficult to distinguish normal hepatocytes from cells of HCC and/or hepatocellular adenoma..." *Gore & Levine Textbook of GI radiology p. 1873, 1899.*
- Dähnert [p. 708] describes the 99mTc-sulfur colloid appearance as follows: focal photopenic lesion surrounded by a rim of increased uptake (compression of normal liver). *However*, be aware that some other references were not quite this clear:
  - *NM Req.* says **un**differentiated HCC refuses to fill in (p. 247). Further, there is a fairly broad differential for photopenic defects on 99mTc-sulfur colloid imaging (metastases, cavernous hemangioma, etc.) such that the appearance of hepatic adenoma is not completely characteristic. *see Mettler 4th p. 241-242.*
- The other choices are clearly true *(Dahnert 5th p. 708):*
  - Propensity to bleed: Intratumor or intraperitoneal hemorrhage (40%)
  - RUQ pain as a sign of mass effect (40%)
  - most frequent hepatic tumor in young women after use of contraceptive steroids (2.5x risk over 5 years)

See Dahnert 5th 708 and 714: all are clearly true except choice C.

- Differentiation from a high-grade HCC can be difficult, if not impossible. Adenomas tend to lack malignant-appearing mitotic structures, the cell plates generally are only 2 cells thick, and no cellular infiltration (invasion) into the capsule or surrounding liver parenchyma occurs. Unfortunately, these features also may be absent in HCC, especially if it is well differentiated.
  - *emedicine*

- **Lipoma in colon , which is true--**
  a. most common nonepithelial tumor
  b. more common in elderly obese patients
  c. present with obstruction
  d. originates from epithelial cells

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A. Most common nonepithelial tumor

- Lipomas of the colon are not common but do represent the next most common benign tumor of the large bowel after adenomas. *GI Req. 2nd p. 348.*
  - Adenomas / Adenocarcinoma are epithelial in origin (adenomatous polyp = epithelial polyp). *Dähnert 5th p. 787.*
  - Most common *submucosal* tumor in the colon.
  - Usually in cecum and ascending colon
  - Typically asymptomatic but may have crampy pain.
  - Rarely causes intussusception (not obstruction).

  Dähnert 5th p. 840

- **In a previously healthy 28 yr old man an 8 cm mass is found in liver. CT shows heterogeneous enhancement with central scar. Most Likely diagnosis--**
  a. FNH
  b. Fibrolamellar carcinoma
  c. Adenoma
  d.

- **In a previously healthy 28 yr old man an 8 cm mass is found in liver. CT shows heterogeneous enhancement with central scar. Most Likely diagnosis--**

  a. FNH

  b. Fibrolamellar carcinoma

  c. Adenoma

B. Fibrolamellar carcinoma

- Mean age is 23 years with a M:F of 1:1. No underlying cirrhosis or known risk factors, alpha-fetal protein is negative. Well-circumscribed strikingly desmoplastic tumor with calcifications + fibrous central scar. Partially/completely encapsulated solitary mass 4 – 17 cm (mean 13cm) in diameter. Prominent central fibrous scar (45-60%). CT: mass of low attenuation with prominent heterogeneous enhancement. ***Dähnert 5th p. 715***.
- FNH: rare benign congenital hamartomatous. Oral contraceptives do not cause FNH, but does have a trophic effect on its growth. More common in females in 3rd or 4th decades. Has a cental scar. Different phases of enhancement. Size <5cm in 85%. **Dahnert 5th 703.**
- Note that the fibrous scar in FLC, when present, does not enhance as expected. This is in contradiction to FNH, in which the central scar, which is in reality a vascular entity, enhances on arterial-phase CT scan images. This difference distinguishes the two masses. However, this finding is not absolute.
  - emedicine

- **Large intraductal papillary mucinous neoplasm in pancreas—most common radiologic finding--**
  a. Calcification
  b. Unifocal large cystic mass
  c. Dilatation of pancreatic duct(s)
  d. single large cyst

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  a. Calcification
  b. Unifocal large cystic mass
  c. **Dilatation of pancreatic duct(s)**
  d. single large cyst

C. Dilatation of pancreatic duct(s).

- Intraductal Papillary Mucinous Tumor (IPMT):
  - has been called ductectatic mucinous tumor in the past *(Dähnert 5th 716)*
  - it distends the ductal system producing an apparent multiloculated mass ("cluster of grapes")
  http://www.ijri.org/articles/current_issue/abdominal_501.htm
  - 1-2% of all exocrine tumors of the pancreas
  - elderly males (~ 65 yrs.); relatively good prognosisConsidered premalignant pancreatic lesions, and histologically may demonstrate areas ranging from hyperplasia to carcinoma within a single tumor (11). Although extensive longitudinal intraductal growth can be observed, they are slow to invade periductal tissues radially and slow to metastasize. *see also Lichtenstein D, Carr-Locke D, Mucin-secreting tumors of the pancreas. Gastrointestinal Endoscopy Clinics of N America, 1995;5:237-258*
- *See **Dahnert 5th 716-717**.*

- **Concerning the microcystic pancreatic neoplasm, which is false?**
  a. occur in elderly female
  b. has malignant potential
  c. shows contrast enhancement

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- Microcystic pancreatic neoplasm has **no** malignant potential. It is a benign lobulated neoplasm composed of innumabable small cysts (1-20 mm) containing proteinaceous fluid separated by thin connective tissue.
- 82% occurs in over 60 years of age (M:F 1:4), therefore A is true.
- CT shows attenuation values close to water and contrast enhancement (C is true). US shows predominantly echogenic mass with mixed hypoechoic + echogenic arease. It is associated with von Hippel-Lindau syndrome. Angio shows hypervascular mass with dilated feeding arteries, dense tumor blush, prominent draining veins, neovascularity, occasional AV shunting, and No vascular encasement. Treatment is surgical excision/ follow up examinations.
- ***Dähnert 5th p. 721-722***.

- **Which of the following is the most common type of choledochal cyst--**
  a. choledochocele
  b. fusiform dilatation of the extrahepatic duct
  c. extrahepatic duct diverticulum
  d. Caroli's disease

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  c. extrahepatic duct diverticulum
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- Types of choledochal cysts:
  1. **fusiform** dilatation: CBD + CHD (~85%)
  2. diverticulum of extrahepatic ducts (1-3%) originating from CBD/CHD
  3. choledochocele (1-6%): cystic dilatation of distal CBD with herniation of CBD into duodenum (similar to ureterocele)
  4. multiple segmental cysts: in intra- and extra- hepatic ducts (19%)
  5. intrahepatic cysts = Caroli's disease *Source: Dähnert pp 554, 575*

- **Which of the following is true regarding Zenker's diverticulum--**
  a. muscular contractions lead to emptying
  b. posterior midline of the lower pharynx
  c. inferior to cricopharyngeus
  d. traction diverticulum

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  c. inferior to cricopharyngeus

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- Zenkers diverticulum arises in the hypopharynx just proximal to the UES. It is located in the posterior midline at the cleavage plane, known as Killian's dehiscence, **between the circular and oblique fibers of the cricopharyngeus muscle**. It is located **at C5-C6** and its neck is more cephalad than its base, encouraging the trapping of food and liquid. Barium examination shows a partially barium-filled outpouching at the **junction fo the hypopharynx and cervical esophagus**. A picture in Brant and Helms (pg 713) shows that it is near the junction of the upper cervical esophagus and hypopharynx, but not confirmed in the literature. *Brant and Helms pg 713; Dähnert 5th p. 866.*

- **The most common complication of ERCP is**
  a. hemorrhage
  b. pancreatitis
  c. bile leak
  d. bowel perforation

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  a. hemorrhage
  b. pancreatitis
  c. bile leak
  d. bowel perforation

B. Pancreatitis

- Complications of ERCP: pancreatitis 5%; duodenal perforation; GI bleeding *Source: Primer 3rd p. 221.** Gore & Levine, Table 87-5 p. 1602 lists complications of ERCP: **Pancreatits 1%;** cholangitis 0.8%; drug side effects 0.6%; pancreatic abscess 0.3%; GI injury 0.2%; mortality 0.2%

- **Which is the most common cause of pre-sinusoidal portal hypertension**
  a. passive venous congestion
  b. budd-chiari syndrome
  c. cirrhosis
  d. schistosomiasis

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D. Schistosomiasis

- Portal Hypertension is defined as a portal pressure > 10 mm Hg. Most commonly caused by hepatic cirrhosis. Clinical manifestations occur because of altered flow dynamics; GI variceal bleeding is the most common presentation. ***Dähnert 5th p. 733.*** Causes:
  - Presinusoidal – Schistosomiasis (most common cause worldwide), portal vein obstruction (thrombosis, tumor)
  - Sinusoidal – Hepatitis, sickle-cell dz
  - Postsinusoidal – Cirrhosis, Budd-Chiari syndrome, Hepatic vein or IVC obstruction. *Primer 3rd p. 681*
- CHF (passive venous congestion) is post-hepatic

- **Primary sclerosing cholangitis – what is it most associated with?**
  a. ulcerative colitis
  b. stones and surgery (are causes for secondary cholangitis)
  c. Crohn's disease
  d. clonorchis infection

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  a. ulcerative colitis

  b. stones and surgery (are causes for secondary cholangitis)

  c. Crohn's disease

  d. clonorchis infection

- Associated with UC in 50-74%
  - Crohn's in 13% *(Dähnert 5th p. 688)*
- Characterized by insidious onset of jaundice with progressive disease affecting both intrahepatic and extrahepatic bile ducts. Alternating dilation and stenosis produces a characteristic beaded pattern of intrahepatic cts. Small saccular outpouching (duct diverticula), demonstrating on cholangiography, are considered to be pathognomonic. *Brant and Helms 682*

- **At the ileocecal region, which of the following organisms are least likely?**
  a. TB
  b. salmonella
  c. giardia
  d. campylobacter
  e. yersinia

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  d. campylobacter
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- Giardia Lamblia may cause narrowing secondary to thickening of folds in the duodenum and proximal jejunum.
- TB causes narrowing and sometimes marked distortion of the ileocecal region.
- Other infections in which fold thickening and luminal narrowing are usually localized to the distal ileum include campylobacter, yersinia and salmonella.
- Distal ileum processes: Crohn's, TB, infectious enteritis, lymphoma, carcinoid, metastases
- Giardia usually involves duodenum and jejunum
- ***GI Requistes 107, Dahnert 5th 766, 829***

- **Which of the following is *not* associated with delayed gastric emptying?**
  a. hyperglycemia
  b. Gastrinoma (Zollinger-Ellison syndrome)
  c. hypothyroidism
  d.

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- In Nuclear Medicine Requisites pg 275 they have a chart which list causes of Rapid Gastric Emptying and Gastrinoma is one of them.
  - Hypothyroidism and Diabetes are listed as causes of Gastric Stasis.
- ***Dahnert 5th 1111***

2000

- **Which of the following is *not* a feature of Oriental Cholangitis?**
  a. Stones
  b. Jaundice
  c. RUQ pain
  d. Elderly Asians
  e. Fever
  f. Causes biliary dilatation

2000

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- Recurrent pyogenic cholangitis (also known as intrahepatic stone disease or oriental cholangiohepatitis) is a unique form of gallstone disease usually found in patients from Southeast Asian countries. These patients have large stones scattered through out the intrahepatic biliary system with marked dilation of proximal intrahepatic ducts. These patients are **20-50 years old** and present with recurrent fever, chills, abdominal pain, and jaundice. *[Dähnert p. 689]*

- **30 year old female with multiple liver lesions on CECT. One is of water density. Some have central hyperdensity with enhancement. What is the most likely diagnosis?**
  a. Caroli's disease
  b. Cholangitis
  c. Multiple cavernous hemangiomas
  d. Multiple abscesses
  e. Polycystic liver disease
  f. Multiple adenomas
  g. Mets

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  e. Polycystic liver disease
  f. Multiple adenomas
  g. Mets

Remember the CENTRAL DOT sign!!! *T-rok*

- **<u>B. Caroli's disease</u>**
- Caroli's disease is a Type 5 choledochal cystic disease limited to the intra-hepatic ductal system and manifests as segmental saccular dilatation . The portal vein is completely surrounded by the dilated bile ducts= the "**central dot sign**" on CT. This finding when present increases the specificity for the diagnosis on CT. Seen in the first 3 decades. Polycystic liver disease is a differential and sometimes need to do a luminal contrast study- ERCP/ PTC to differentiate it from Caroli's. [***Dähnert 5th ed p. 685, GI Req p. 183***]

- **What tumor is most likely to be *hypo*vascular in the pancreatico-duodenal region?**
  a. Leiomyosarcoma
  b. Microcystic adenoma
  c. Adenocarcinoma
  d. Glucagonoma
  e. Insulinoma
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  e. Insulinoma
  f. Mets

C. Adenocarcinoma

- Pancreatic ductal adenocarcinoma:
  - mass with central zone of **diminished** attenuation (75-83%)
  - Incidence: 27,000 per yr., 5th leading cause of CA death ***Dähnert 5th p. 724***.
- AdenoCA, lymphoma, mucinous cystic neoplasms, solid and papillary epithelial neoplasm, mets and focal pancreatitis are hypovascular pancreatic masses.
  - Note that Adeno CA, mucinous cystic neoplasms, solid and papillary neoplasm, etc. are of **Epithelial Origin**. ***Dähnert 5th p. 668***.
- Islet cell tumors, serous / microcystic adenoma, mets from melanoma, and RCC are Hypervascular pancreatic masses. *[GI Req p. 147]*

- **Areae gastricae in the stomach represents which of the following:**
  a. Clusters of gastric glands
  b. Pre-malignant condition
  c. Pepsin producing cells
  d. Response to hyperacidity/hypertrophic gastritis
  e. Parietal cells

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  a. **Clusters of gastric glands**
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  c. Pepsin producing cells
  d. Response to hyperacidity/hypertrophic gastritis
  e. Parietal cells

A. Clusters of gastric glands

- When examining the surface of the gastric mucosa with a magnifying lens in the fresh specimen, it is seen to be divided into a multitude of small, slightly elevated polygonal areas by numerous linear depressions. These raised areas, which measure from 1.0 to 6.0 mm in diameter, are called the areae gastricae (= Latin for gastric folds). On the surface of the areae gastricae numerous small tubular invaginations, the gastric pits or foveolae, are seen. It is into the bottom of these pits that the gastric glands open. Double contrast radiographic examination demonstrates the areae gastricae *Macintosh CE, Kreel L. Anatomy and radiology of the areae gastricae.* Gut *l977, l8, 855-864.*

- **What is the least likely location of intraperitoneal mets to the colon?**
  a. Superior aspect of the transverse colon
  b. Superior aspect of the sigmoid colon
  c. Lateral aspect of the cecum
  d. Medial aspect of the cecum
  e. Anterior aspect of the recto-sigmoid

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  c. Lateral aspect of the cecum
  d. Medial aspect of the cecum
  e. Anterior aspect of the recto-sigmoid

- Tumor cells in ascitic fluid tend to implant in four locations:
  1) **superior border of the sigmoid colon,** where the sigmoid mesocolon temporarily traps fluid in the left inframesocolic compartment
  2) **anterior wall of the rectosigmoid**, where the rectovaginal or rectovesical pouches constitute the most dependent portions of the peritoneal cavity
  3) **right paracolic gutter**, via which most excess fluid in the pelvis flows superiorly
  4) **ileocecal region**, which is the most dependent portion of the right inframesocolic compartment. *ACR GI CD-Rom. and Brant and helms p. 673*

- The ovaries demonstrate drop metastases on a CT of the abdomen and pelvis. Which of the following is the most likely primary?
  - breast
  - colon
  - gallbladder
  - kidney
  - stomach

- The ovaries demonstrate drop metastases on a CT of the abdomen and pelvis. Which of the following is the most likely primary?
  - breast
  - **colon**
  - gallbladder
  - kidney
  - stomach

Colon

- 3-8% Colon

- Primary neoplasms were located in the colon (20 patients), breast (six), stomach (five), small bowel (one), bladder (one), and Wilms tumor of the kidney (one)
  - ***Ovarian metastases**: computed tomographic appearances; Radiology*

Variant recall ?

- **4. Lady with cervical cancer had “drop mets” to ovaries, mimicking stage 3 cancer. Which cancers do not cause this:**
- **a. metastatic breast**
- **b. colon**
- **c. gallbladder**
- **d. renal**

Variant recall ?

- **4. Lady with cervical cancer had “drop mets” to ovaries, mimicking stage 3 cancer. Which cancers do not cause this:**
- **a. metastatic breast**
- **b. colon**
- **c. gallbladder**
- **d. renal**

- **Gastric acid is produced by which cells?**
  a. Argentaffin
  b. Parietal
  c. Columnar
  d. Goblet
  e. Mucous cell
  f. Kupffer cell

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  d. Goblet
  e. Mucous cell
  f. Kupffer cell

B. Parietal

- Parietal cells are stimulated to secrete acid by vagal stimulation, endocrine (primarily gastrin), and local histamine release from mast cells. Goblet cells are found in bronchi, bronchioles, and small intestine and secrete mucin. Columnar cells are absorptive cells found in the small bowel. *[Robbins p. 688, 768, 784]* Argentaffin pertains to cells or tissue elements that reduce silver ions in solution, thereby becoming stained brown or black (argentaffinoma – syn. Carcinoid tumor*). [Taber's cyclopedic Medical Dictionary p. 146]*
- ***Dahnert 5th 782-783.***

- **Regarding hepatic abscesses, which is true?**
  a. Echinococcus granulosus causes hydatid cysts
  b. Multi-locular abscesses respond to percutaneous drainage
  c. Amebic abscesses require surgical or percutaneous drainage
  d. 80% of pyogenic abscesses are cryptogenic

Echinococcus granulosus causes hydatid cysts

- Echinococcus granulosus causes liver and lung cysts among other organs (*Brandt/Helms, p. 410, 2nd ed., **Dähnert 5th***
- Answer B is false: multiloculated collections are better managed surgically.
- Answer C is false; these are treated with Flagyl and chloroquine.
- Answer D is false; about half are caused by Staph, strep, and anaerobes. 45% are cryptogenic. **Dahnert 5th 707-708.**



Hydatid cysts



- **Which is the most specific ultrasound sign of portal venous hypertension?**
  a. Splenomegaly
  b. Portal vein enlargement
  c. Hepatic vein enlargement
  d. Ascites
  e. Porto-systemic collaterals
  f. Enlarged hepatic vein

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B. Portal vein enlargement

- The most specific sign for portal hypertension is enlargement of the portal vein. In fact, a diameter of greater than 1.3 cm is 100% specific for portal hypertension *(Gore and Levine 1620).* Recanalization of umbilical vein and hepatofugal flow are diagnostic. *[Primer p. 681]*The most specific sonographic signs of portal hypertension is dilatation of the portal vein > 13 mm (100% specificity, 57% sensitivity) and loss of respiratory increase of splanchnic vein diameters (100% specificity, 80% sensitivity). ***Dähnert , p.733***

- **No flow is detected in the portal vein on Doppler-pulse wave imaging. What can you do?**
  a. Change the angle
  b. Increase pulse repetition frequency (PRF)
  c. Add a wall filter
  d. Change to a lower frequency transducer
  e. Increase the sample volume

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A. Change the angle

- The duplex system allows estimation of the flow velocity directly from the Doppler shift frequency, since the velocity of sound and the transducer frequency are known, while the Doppler angle can be estimated from the B-mode image by the user and input into the scanner computer for calculation. Errors in the flow volume may occur. The vessel axis might not lie totally within the scanned plane, the vessel might be curved or flow might be altered from the perceived direction. The Doppler angle could be in error, which is much more problematic for very large angles, particularly those greater than 60 degrees. The Doppler gate (sample area) could be mispositioned or of inappropriate size, such that the velocities are overestimated (usually too small) or underestimated (usually too large) of the average velocity. *Source: Bushberg 2nd ed. p. 538*Remember, cos(90°) = 0, so if the transducer is perpendicular to the vessel, no flow can be detected.

- **Which would least likely affect small bowel in AIDS?**
  a. MAI
  b. CMV
  c. Candida
  d. Cryptosporidium

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  d. Cryptosporidium

C. Candida

- All of the other choices can affect the entire bowel. Candida presents with mucosal ulceration most commonly in the esophagus. It can affect the stomach and rarely the colon, and although the SB can be affected, it is least common. ***Dahnert 5th 788-791.*** [*GI Req p 309, Primer p. 272, B&H 714]*
- Small bowel MAI infection aka Pseudo-Whipple disease

- **Which is most likely infection of the esophagus in HIV:**
  a. Viral
  b. Candida
  c.
  d.

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  b. Candida
  c.
  d.

B. Candida

- The most common cause of infectious esophagitis is Candida. This is highly prevalent in AIDS patients. Usually, these demonstrate long, linear filling defects from raised plaques. However, with AIDS, the disease is more fulminant and results in the classic "shaggy esophagus" appearance (*Brant/Helms 714*).
- ***Dahnert 5th 821-823.***

- **What is the most likely cause of multiple target lesions in the spleen on CECT in an immunocompromised patient?**
  a. Lymphoma
  b. Multiple fungal microabscesses
  c. Disseminated PCP
  d. Multiple infarcts

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B. Multiple fungal microabcesses

- Fungal infection is the most common in an immunocompromised patient. *US Req 2nd p. 214* Splenic microabscesses are caused by fungus, and represent 26% of splenic abscesses
  - multiple round hypoechoic / hypoattenuating "target" lesions of 5-10 mm. ***Dähnert 5th p. 670.***

- **Regarding islet cell tumor of pancreas:**
  a. insulinomas are usually malignant
  b. non-functioning tumor usually have not metastasized at the time of diagnosis
  c. glucagonomas are the most common
  d. associated with VHL
  e. usually hypovascular

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Associated with VHLvon Hippel-LIndau Disease:

- ***Dähnert 5th p. 328, 724-726.***

MEN

- Type I: renal/pancreatic cysts, no pheochromocytoma
- **Type IIA**: pheo. & **pancreatic islet cell tumor** (typically no cysts)
- Type IIB: pheo. & renal & pancreatic disease

Insulinomas – 90% are benign.

Non-functioning tumors grow large and metastasize before being diagnosed. Insulinomas are most common; gastrinomas are 2nd most common.

Glucagonomas are uncommon. ICT's are found in 20% of patients with VHL.

They are usually hypervascular. [*GI Requisites pp. 146-148]*

Only 10% of insulinomas are malignant, compared to 60% of gastrinomas and 80% of non-functioning tumors. VHL does have an association with islet cell tumors as well as pancreatic cysts and cystadenoma/ cystadenocarcinoma. Non-functioning tumors are associated with coarse calcifications, large size, cystic degeneration, necrosis, local and vascular invasion, and metastases (*BH 695-7).*

- **Most common pancreatic islet cell tumor**
  a glucagonoma
  b insulimoma
  c somatinstoma
  d vipoma

- **Most common pancreatic islet cell tumor**
  a glucagonoma
  b insulinoma
  c somatinstoma
  d vipoma

B. Insulinoma

- Islet cell tumors: 85% are functional
  - Insulinoma – most common; may be associated with MEN 1
  - Gastrinoma – 2nd most common, MEN 1 in 10-40%
  - Glucagonoma – rare
- ***Dahnert 5th 724-726.***

- **A 70 year-old female presents with a pancreatic mass with a central calcification. The calcification was noted on a CT scan 5 years earlier. What is the most likely diagnosis?**
  a. Serous cystadenoma
  b. Adenocarcinoma
  c. Pseudocyst
  d. Chronic pancreatitis

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A. Serous cystadenoma

- Microcystic adenomas of the pancreas (aka serous cystadenoma) are **benign** lobulated neoplasm composed of unnumerable small cysts (1-20mm) containing proteinaceous fluid separated by thin connective septa. They represent 50% of all cystic pancreatic neoplasms. The mean age of patients are 65 and **82% of patients are over 60**. **Female:male 4:1**. Location: anywhere in the pancreas but have a slight predominance in the head. Appearance: well demarcated lobulated mass 1-25 cm (mean 5 cm) in diameter with smooth nodular contour. Innumerable small <2 cm cysts. **Prominent central stellate scar** (Characteristic) Amorphous **central calcifications** in dystrophic area of scar. Pancreatic duct/CBD may be displaced, encased or obstructed. On CT: attenuation values close to water, enhance with contrast. *Source:* ***Dahnet 5th 721-722****;* *Gastrointestinal Radiology The Requisites p - 152*

- **What is the chance of malignancy in a 1.5cm colonic polyp in a 50 yo male?**
  a. 1%
  b. 10%
  c. 35%
  d. 60%
  e. 90%

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  e. 90%

B. 10%

- Depends on the type of polyp. The neoplastic polyps are usually adenomas. Epithelial polyps are tubular (75%), tubulovillous (15%), or villous adenoma (10%). FYI, the most common is a nonneoplastic hyperplastic polyp (90%). The **malignant potential** is based on SIZE.

	Tubular	Tubulovillous	Villous
< 1 cm	1%	5%	10%
1-2 cm	10%,	7%	10%
> 2 cm	30%;	40%	50%

[Dähnert 5th p. 787]

- **Which has the highest risk of malignancy?**
  a. Juvenile polyposis
  b. Barrett's esophagus
  c. Ulcerative colitis
  d. Gardner syndrome
  e. Menetrier's disease
  f. Granulomatous enteritis

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D. Gardner's syndrome

- Gardner's syndrome is a polyposis syndrome which affects the colon 100% of the time and the duodenum 90% of the time. Malignant transformation is 100% if untreated. ***Dähnert 5th 824.***
- Peutz-Jegher (other exam choice) consists of hamartomatous polyps which typically affect the small bowel more than the colon and stomach. These are non-neoplastic but may be associated with pre-malignant adenomatous polyps. 2-3% get colorectal CA. **Dahnert 5th 852-853**.
- Juvenille polyposis consists of large polyps in the rectum which can prolapse or obstruct, 15% get colorectal CA by age 35. **Dahnert 5th 838**.
- Ulcerative Colitis is associated with a 0.5-1%/year risk of colorectal adenocarcinoma, overall 3-5% chance colorectal CA. **Dahnert 5th 864.**

- **Which Of The Following Is Not Inherited ?**
  a. Cronkite-Canada
  b. Peutz-Jegher
  c. Juvenile Polyposis
  d. Multiple Hamartomas
  e. Gardners
  f. Turcot's

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A. Cronkite-Canada

- Nonneoplastic **nonhereditary** polyps--Associated with ectodermal abnormalities. Age 42-75, Protein losing enteropathy, diarrhea, wgt. loss, anorexia_M>F, abd. pain, nail atrophy, macules hands and feet, alopecia,thickened gastric rugae, multiple polyps ***Dähnert p. 810-811;*** *Gastrointestinal Radiology The Requisites p – 253*

- **A 20 y/o male presents with a skin rash, diffuse sclerosis of bone, flushing, tarry stools, and a gastric ulcer. What is the most likely diagnosis?**
  a. Gardner's syndrome
  b. carcinoid
  c. mastocytosis
  d. sickle cell anemia
  e. lymphoma

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  e. lymphoma

C. Mastocytosis

- Mastocytosis - systemic disease with mast cell proliferation in skin + RES (lamina propria of small bowel; bone; lymph nodes; liver; spleen) associated with eosinophils + lymphocytes
  - Epidemiology - Age: <6 months old (in 50%)
  - Signs/symptoms: nausea, vomiting, diarrhea, steatorrhea, urticaria, abdominal pain, anorexia,alcohol intolerance, tachycardia, asthma, flushing, headaches, pruritus
  - Small bowel - generalized irregular distorted thickened folds ± wall thickening, diffuse pattern of 2 - 3 mm sandlike mucosal nodules, urticaria-like lesions of gastric + intestinal mucosa Small bowel, generalized irregular distorted thickened folds ± wall thickening, diffuse pattern of 2 - 3 mm sandlike mucosal nodules, urticaria-like lesions of gastric + intestinal mucosa
  - Liver & spleen – hepatosplenomegaly
  - Bone - sclerotic bone lesions *[**Dähnert p. 844-845**]*; (*Brant and Helms 746, 755; Weissleder 170).*

- **Which of the following are not always seen with sprue?**
  a. hypersecretion
  b. folds > 4 mm
  c. villous atrophy on biopsy
  d. asymptomatic intussusceptions seen during examination
  e. Moulage pattern on barium study

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B. folds > 4mm

- Mucosal folds can be normal / thickened / effaced (depending on hypoproteinemia). Typically not thick.
- Hypersecretion-related artifacts are seen in Sprue.
- Disease is characterized by malabsorption resulting from atrophy of small intestinal villi.
- Transient intussceptions are commonly observed during fluoroscopy.
- It is best seen in mid + distal jejunum (due to intestinal hypomotility).
- Small bowel dilatation is HALLMARK in untreated celiac disease (70 - 95%). The degree of dilatation is related to severity of disease.
- “Moulage sign" is seen in app. 50% smooth contour with effaced featureless folds resembling tubular wax mold.
  - CHARACTERISTIC of sprue if seen in duodenum + jejunum.
- "jejunization" of ileal loops (= adaptive response to decreased jejunal mucosal surface) = SPECIFIC *[**Dähnert p.859-860**]*

- **A 30yo female presents with diarrhea, a serum protein of 4.5ng/100dl, a small bowel follow through demonstrates dilated bowel, hypersecretion, variable thickened folds with an intussuception appearance.**
  a. Sprue
  b. Scleroderma
  c. Whipple's disease
  d. Gardner's
  e. Familial polyposis

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  c. Whipple's disease

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  e. Familial polyposis

A. Sprue

- **Sprue** is characterized by dilated small bowel loops, hypersecretion, and malabsorption (low albumin). Transient intussusceptions are typical. The jejunal fold pattern is decreased (ilealization of the jejunum) and the ileal fold pattern becomes prominent (jejunization of the ileum).
- **Scleroderma** is characterized by atrophy of the muscularis layer resulting in flaccid, dilated bowel. A "*hidebound*" appearance of the small bowel folds is present, as the thinned folds are tethered together. Excessive contraction of the mesenteric border results in antimesenteric sacculations.
- **Whipple's disease** is caused by Gram-positive rods. Irregularly thickened folds are present, most prominent in the jejunum, with tiny nodules spread throughout the mucosa. *NO dilatation of bowel loops!* CT demonstrates enlarged low density mesenteric lymph nodes *(Weissleder171; Brant and Helms 744-46).* (***Dähnert 5th 859-860, 854, 865***)

- **Which segment of the colon is most prone to ischemia**
  a. ascending
  b. transverse
  c. splenic flexture
  d. sigmoid
  e. rectum

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  a. ascending
  b. transverse
  c. splenic flexure
  d. sigmoid
  e. rectum

C. splenic flexture

- Location: left colon 46-90%, all colon 11%, right colon 30%, transverse 9%, sigmoid 4%, rectum spared. Most commonly affected segments: (watershed areas):
  - **Griffith point(80%) – jx SMA/IMA – splenic fx.**
  - Point of Sudeck – jx IMA/hypogastric – rectosigmoid jx
- Etiology: diminished blood flow within bowel wall (mucosa + submucosa most sensitive to ischemia); major mesenteric vessels usually patent.Precipitating factors:
  (a) bowel obstruction: volvulus, carcinoma (proximal bowel segment affected)
  (b) thrombosis: cardiovascular disease, collagen vascular disease, sickle cell disease, hemolytic- uremic syndrome, oral contraceptives
  (c) trauma: history of aortoiliac reconstruction (2%) with ligation of IMA. [***Dähnert p. 837***]

- **A 50 yo man presents with bloody stools after acute onset of abdominal pain. Films shows thickened folds of the transverse colon. Diagnosis?**
  a. Ischemic colitis
  b. Pseudomembranous colitis
  c. Ulcerative colitis
  d. Granulomatous colitis
  e. Colon cancer
  f. IBD
  g. Diverticulitis
  h. Yersinial Colitis
  i. Embolic

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A. Ischemic colitis

- Mesenteric ischemia classically presents with abdominal pain, rectal bleeding, and thumbprinting.
- UC is a mucosal disease which typically starts in the rectum.
  - Peak incidence is between 20 and 40 years of age.
- Pseudomembranous colitis is caused by overgrowth of C. difficile after long-term antibiotics. The clinical presentation consists of diarrhea, fever, pain, and leukocytosis
- ***Dähnert* 5th 837**; *Brant and Helms p. 757; Weissleder p. 185-86*

- **Regarding Barrett's esophagus:**
  a. usually seen in the upper 1/3
  b. cannot distinguish normal from Barrett's on EGD
  c. UGI can differentiate normal from Barrett's
  d. If untreated can lead to SCC
  e. Associated with reflux

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E. Associated with reflux

- Replacement of squamous epithelium to columnar epithelium
  - Location –lower esophagus> middle > upper
  - Leads to **adenocarcinoma** (<u>not</u> squamous cell!)
  - Results from chronic reflux esophagitis
  - UGI findings are nonspecific and must be followed up by EGD
    - Mid/lower esophageal strictures
    - Large, deep, wide-mouth peptic ulcer
    - Areae gastricae pattern in esophagus
    - Thick, irregular mucosal folds
    - Fine granular mucosal pattern
    - Hiatal hernia
  - Diagnosis made with endoscopy and endoscopic biopsy to r/o adenocarcinoma
- ***Dähnert 5th 796***, GI Req p.17

- **Regarding viral esophagitis:**
  a. more common than monolial
  b. associated with immunocompromised patient
  c. common cause of stricture
  d. assoc. w/ reflux dz
  e. can occur inferior to the crico-pharyngeal muscle

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- Viral esophagitis tends to occur most commonly in AIDS/ immunocompromised patients and include herpes esophagitis, CMV esophagitis, and HIV esophagitis. The hallmark of these lesions are ulcers surrounded by a radiolucent rim of edematous mucosa not strictures. Many of these lesions can occur in the oropharynx. *Ref. Chapter 5 Double contrast GI radiology, Levine and Laufer*
- Candida albicans (monoliasis) is the most common cause of infectious esophagitis. Reflux is the most common cause of esophageal stricture. Other causes include Barrett's, corrosives, radiation, neoplasm, webs. [*GI Requisites p. 14. Brant & Helms p. 714-715*].
- Viral esophagitis usually mid and lower esophagus, less in upper esophagus and oropharynx. Candida usually involves upper ½ of esophagus and oropharynx. Therefore, ***choice E is also correct***, but perhaps it was misworded or inaccurately recalled.
- ***Dahnert 5th 821-823***

- **Viral esophagitis presents as**
  a. shaggy ulcers
  b. strictures
  c. large ulcers
  d. annular lesions

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C. Large Ulcers**

- These lesion tend to present as discrete, superficial ulcers---they are not shaggy. (* shaggy ulcers would be more typical for candida)
  Ref. Chapter 5 Double contrast GI radiology, Levine and Laufer
- ***CMV and HIV characteristically present with large ulcers, but Herpes classically presents with small, punctate ulcers.*
- ***Dahnert 5th 821-823.***

- **What is the most common cause of benign gastric ulcer along the greater curvature?**
  a. antacids
  b. morphine
  c. tetracycline
  d. KCl
  e. Prednisone
  f. *C. diff*
  g. ASA

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G. ASA

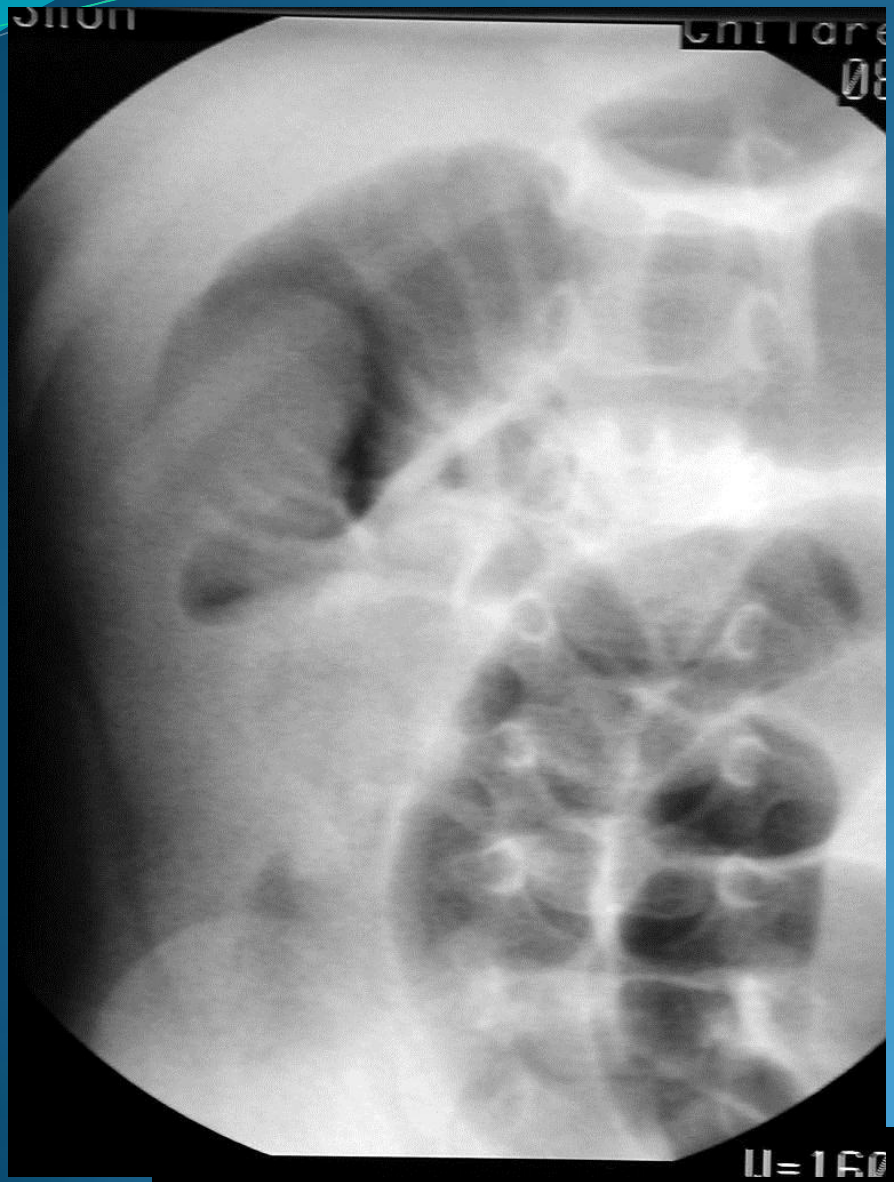
- The classic location of NSAID ulcers is in the antrum along the greater curvature. In addition, the incidence of PUD from H.pylori is increased in patients on NSAIDS. Tetracycline along with Bisthmuth and Flagyl are used to treat H.Pylori.
- Most benign gastric ulcers occur along lesser curvature, or near GE junction with hiatal hernias.
- *GI Requisites p. 17,* ***Dähnert p. 826-827.***
- flattening of the greater curvature of the distal antrum, particularly if associated with erosive gastritis or gastric ulcers, is a useful radiologic sign of NSAID-related gastropathy.
  - ***Greater curvature antral flattening: A radiologic sign of NSAID-related gastropathy***
  - *Abdominal Imaging*

- **Regarding intussusception:**
  a. the most common site of perforation is the intussusceptum
  b. ileocolic is the most common type
  c. a lead point is more likely in a recurrent intussusception
  d. it most commonly occurs in 18 m/o - 5 y/o.
  e. a lead point is found in 50% of recurrent intussusceptions

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ileocolic is the most common type

- 95% occur in children and 75-95% of these are ileocolic (ileoileal is more common in adults). Peak incidence is 5-9 months (40%), 60% occur before the 1st year 90% before the 2nd. [*GI Requisites pp. 88-91.*] Regarding perforation: it occurs either at the inner most wall(the intesusceptum) or at the outer most wall(the intususcepiens)
- "Children with recurrent intussusception appear to be no more likely to have a lead point than those with single episodes." ***Kirks, 3rd ed, pg 920.***
- "Perforation due to intussusception usually occurs in the intussuscipiens…" ***Kirks, 3rd ed, pg 922.***
- ***Dahnert 5th 835-837.***



- Intussusception evident during air contrast enema prior to reduction.

- **Which of the following is not seen with leiomyosarcoma of stomach?**
  a. larger tumor may show cystic area of necrosis
  b. usually broad based intramural mass
  c. treated with chemo and XRT
  d. spread hematogenously
  e. better prognosis than other gastric cancers

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C. Treated with chemo and XRT

- Leiomyosarcomas are large submucosal lesions with single, multiple, or cavitary ulcerations. These masses tend to grow silently to a very large size and have central hemorrhage and necrosis. They may be pedunculated or exogastric. They metastasize hematogenously. Histologic differentiation from leiomyoma is difficult and differentiation is based on size, gross appearance, and behavior of the tumor. Chemo and XRT have not proven useful. (*Brant and Helms p. 727,* ***Dähnert 840***) http://www.emedicine.com/med/topic1180.htm

- **Giardiasis in small bowel causes?**
  a. GI blood loss/chronic GI bleeding
  b. chronic malabsorption
  c. ulcers in ileum
  d. most commonly jejunal
  e. negative stool exam rules out
  f. most commonly gastroduodenal
  g. most commonly ileal
  h. Usually seen in immunocompromised
  i. Causes strictures

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B. chronic malabsorption

- Giardiasis causes malabsoption, both acute and chronic. Giardia typically involves the duodenum and jejunum.
  - Symptoms include abdominal pain, diarrhea, and malabsorption. The diagnosis is made upon finding cysts or trophozoites in the feces, although this is variable so multiple samples should be taken. No association with GI bleeding is mentioned. 1.5 – 2% US population, 4-16% tropical countries, 3-20%
  - children in southern US. Immunocompromised are predisposed.
- ***Dahnert 5th 829****, Brant and Helms 733; Harrison's Int. Med. 910-12.*

- **Regarding aphthous ulcers in Crohn's disease:**
  a. are usually specific for the disease
  b. usually painful
  c. irreversible
  d. bleed
  e. denote involvement of the circular muscle layer

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B. usually painful

- Aphthous ulcers are not specific - ddx is long - amebic colitis, TB, Behcets. (***Dähnert 5th p.766, 809-810***). Aphthous ulcers are caused by mucosal edema and erosions over lymphoid follicles, and are the earliest radiographic sign of Crohns (*AFIP notes)*

- **What is true re Crohn disease?**
  a. asymmetrical mural involvement/ simultaneous involvement of colon and SB
  b. continuous involvement of colon and SB
  c. most often involves SB and colon
  d. frequently involves gastroduodenum
  e. most commonly involves jejunum

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A. asymmetric mural involvement

- Crohn's disease involves the colon and TI 55% of the time, only small bowel 30%, and only colon 15%. There is typically asymmetric involvement both longitudinally and around the lumen. Skip areas represent normal intervening bowel. The duodenum is involved 20% of the time (*Brant and Helms 747; Weissleder 184-185.)*
- ***Dahnert 5th 809-810****, Primer 2nd 184-185.*

- **The following statements regarding Glucophage (metformin) are false except:**
  a. Combines with iodine and causes nephrotoxicity
  b. Can't give iodinated contrast if taken within 48hrs of the study
  c. Causes lactic acidosis in patients with impaired renal function
  d.

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- Metformin may cause lactic acidosis, mainly in patients with impaired renal function.
- If a patient is to have iodinated contrast, metformin should be withheld for 48 hours after the examination, but metformin may be taken up to the examination. Renal function should be checked before reinstituting metformin. (*Bristol-Squibb, metformin package insert*).
- The reason for these warnings is not the presence of a direct drug-to-drug interaction; no such interaction occurs. Rather, the problem is that: 1) intravascular administration of iodinated contrast may cause acute renal failure in a small percentage of individuals, particularly those patients with preexisting, or a predisposition to, renal compromise (e.g., diabetics[!]), and 2) in patients with renal failure, Glucophage, which is excreted by the kidneys, may build up to dangerous levels, causing the potentially fatal condition of lactic acidosis.

- **A man undergoes a SBFT and has an excavating, freely mobile mass in the region of the TI. Most likely cause--**
  a. Carcinoid
  b. Crohns dz
  c. Lymphoma
  d. Adenocarcinoma
  e. TB
  f. Leiomyosarcoma
  g. melanoma

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- A smooth polyp observed in the terminal ileum should always be considered a probable carcinoid tumor
  - *emedicine:; Malignant Carcinoid*

- **C. Lymphoma** (most likely choice)
- Lymphoma of GI tract:Radiographic types-***Dähnert 5th p. 841-842***
  - Polypoid / nodular (47%); Ulcerative (42%)--may be complicated by perforation; Diffusely infiltrating (11%)
  - **most common** malignant SB tumor (20% of SB malignancies); 51% in ileum
  - may present as a large mass with only a small intramural component
  - Lymphoma affects the TI most often due to the amount of lymphoid tissue normally found there
- Leiomyosarcoma of small bowel: duodenum 26%, jejunum 34%, ileum 40%
  - may show central ulcer pit / fistula communicating with a **large necrotic center**. ***Dähnert 5th p. 840***.
  - Leiomyosarcoma is more common in the ileum than jejunum. Most are exophytic and grow to large size. Ulceration and bleeding are common [* probably less common overall than lymphoma, however]
- Carcinoid is the most common small bowel tumor and usually occurs in the TI. However, this tumor tends to be small and submucosal, not freely mobile as mentioned in the root. ***Dahnert 5th 802***
- Adenocarcinoma affects the duodenum and jejunum, but is uncommon in the TI. (*Brant and Helms 738-40, GI Req p. 117*). ***Dahnert 5th 788***

- **A large, well defined homogeneous mass in the ileum of an otherwise asymptomatic adult female is most likely what?**
  a. lymphangioma
  b. hemangioma
  c. adenoma
  d. lipoma
  e. leiomyoma

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- The differential diagnosis for benign small bowel tumors are in order of decreasing frequency are 1) **leiomyoma**, 2) lipoma, 3) adenoma 4) hemangioma and 5) lymphangioma and 6)neurogenic tumors (usually neurofibromatosis).
- Leiomyomas are scattered evenly throughout the small intestine. Leiomyomas, which originate predominantly in the submucosa, manifest as oval or rounded, smooth filling defects. They may occasionally present as pedunculated intraluminal defects or intussusception may occur. Leiomyomas, which grow predominantly in the subserosal layer with little or no protrusion into the lumen, show displacement of bowel loops by the extrinsic mass. Dumbbell-shaped lesions occur. In the latter instance, a bilobed tumor protrudes both extraluminally and intraluminally. On CT, leiomyomas are sharply defined, spherical masses that display homogeneous tissue density and occasionally contain calcifications.
- Adenomas comprise about one-fourth of benign small bowel tumors. They occur more frequently in the duodenum than in the jejunum or ileum. Adenomas appear as intraluminal filling defects that are usually pedunculated and may have a lobulated surface.
- Lipomas usually arise in the ileum and occur less frequently than adenomas or leiomyomas. They also occur with an increased incidence in patients with Turner's syndrome. Similar to other benign small bowel tumors, lipomas appear as smooth or oval, predominantly intramural defect.The softness or fatty nature of the lesion may be inferred by the changes in shape during compression radiography or determined directly by showing attenuation values consistent with fat (-80 to -120 HU) on CT images.
- *Dähnert , 4th ed. P. 770-771, Taveras and Ferrucci Radiology*
- ***Dahnert 5th 840.***

- **The right and left hepatic lobes are divided by the :**
  a. RHV
  b. LHV
  c. MHV
  d. falciform ligament

- **The right and left hepatic lobes are divided by the :**
  a. RHV
  b. LHV
  c. MHV
  d. falciform ligament

C. MHV

- The middle hepatic vein divides the left and right hepatic lobes. The left hepatic vein divides the medial and lateral segments of the left lobe, and the right hepatic vein divides the anterior and posterior segments of the right lobe
- ***Dähnert 5th 673-674***.
- Classic anatomy has the falciform ligament dividing left and right hepatic lobes. MHV is for functional anatomy.

- **The following are true of transrectal/transvaginal drainage except:**
  a. Crohn's disease is a relative contraindication
  b. Coagulopathy is a relative contraindication
  c. Antibiotics should be withheld until a sample is obtained
  d. Self-locking catheter should be used
  e. Medications should be administered for pain and anxiety

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C. Antibiotics should be withheld until a sample is obtained

- Withholding antibiotics to avoid compromising culture results is a dangerous practice that has been abandoned; if infection is suspected, broad-spectrum antibiotics should be administered before the procedure to prevent sepsis. Relative contraindications to percutaneous drainage include significant coagulopathy or inability to evacuate contents through a drainage tube (ie. Necrotic debris, hematoma, or infected tumor). The only absolute contraindication is the necessity to traverse a vital structure. A self-locking catheter should be placed in order to secure the drainage tube, since suturing is not possible
- (*LaBerge 318;* ***Valji 393, 407***).
- "The administration of abx immediately before the procedure does not interfere with cultures of fluid aspitated from the collection." ***Valji 393.***

Bad question

- **Inflammatory bowel disease is more commonly associated with which of the following:**
  a. Ureteral calculi
  b. Bladder calculi
  c. Enterocutaneous fistula
  d.

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C. Enterocutaneous fistula

- **Bad question; fractured recall**

- GU complications of Crohn's disease include urolithiasis (oxalate and urate), hydronephrosis, renal amyloidosis, focal cystitis, ileouretal and ileovesical fistula (5-20%) patients with ulcerative Colitis tend not to have GU complications. Ref. *Dähnert pg 670 Source: Gastrointestinal Radiology The Requisites p – 263*
- 33% with Crohn's get enteric fistulae, 5-10% get urolithiasis
  - ***Dahnert 5th 810***

- **Aneurysmal dilatation of the small bowel is a feature most likely to be seen in which of the following:**
  a. Hodgkin's disease
  b. Carcinoma
  c. Carcinoid
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A. Hodgkin's disease

- Lymphoma: may get aneurysmal dilatation with infiltrating lymphoma of SB due to destruction of autonomic nerve plexus and muscle/ tumor necrosis.
  - ***Dahnert 5th 842.***
- Carcinoid: Usually 2cm or less. No mention of aneurysmal dilatation.
  - ***Dahnert 5th 801-802.***
- Adenocarcinomas: usually annular strictures (60%)
  - ***Dahnert 5th 788***
- Lipoma: 1-2 cm, rarely cause intussusception.
  - ***Dahnert 5th 840***

1999

- **45 Yo Male With Increased Serum Glucose, Unusual Skin Pigmentation, Portal Htn And Inc Liver Attenuation On Ct --- (Q: A Repeat Question On An Elderly Gentleman With Pancreatic Insufficiency, Hyperglycemia, High Attenuation Of Liver And Skin Pigmentation)**
  - Gauchers
  - Wilsons
  - Hemosiderosis
  - Amyloid
  - Steatottic Liver
  - Diabetes Mellitus
  - Hemochromatosis

1999

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  - Amyloid
  - Steatottic Liver
  - Diabetes Mellitus
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- Hemochromatosis: ***Dahnert 5th 706***
  - Excess iron deposition in liver, pancreas, spleen, kidneys, heart. Leads to hepatomegaly, cirrhosis and portal HTN, diabetes mellitus, heart failure. Predisposes to HCC in 15-30%. 90% of patients have hyperpigmentation.
  - Dense liver on CT, hypointense on T2WI.
- Gauchers: ***Dahnert 5th 91-92***
  - Fatty liver +/- cirrhosis
- Wilson's: ***Dahnert 5th 172***
  - Normal attenuation liver (fat and copper average out to normal)
- Hemosiderosis: ***Dahnert 5th 706***
  - Iron deposition WITHOUT organ damage
- Amyloidosis: ***Dahnert 5th 792***
  - Low attenuation liver with decreased enhancement; hepatic function preserved
- Diabetes Mellitus:
  - Fatty liver

- **Most common esophageal ulcer finding in a patient with HIV:**
  - Giant esophageal ulcer
  - Shaggy esophagus.
  - Small ulcerations.
  - Pseudodiverticulitis.
  - Leiomyoma
  - Nodules

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- This questions is probabyl recalled wrong. Very vague. If the most common infection is candidiasis, then I guess shaggy esophagus is the answer.
- HIV-associated esophageal ulcers are giant ulcers (indistinguishable from CMV ulcers)
- Shaggy esophagus is seen in fulminant candidiasis of AIDS
- ***Dahnert 5th 756, 788-789, 821-823***

- **Zenker's diverticula:**
  - Occur below the cricopharyngeus
  - Occur at the posterior and inferior aspect of the pharynx
  - Can contract due to the presence of a muscular wall
  - Are traction diverticula

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B. Occur At The Posterior And Inferior Aspect Of The Pharynx

- This herniation occurs posteriorly at the pharyngeoesophageal junction, in an area of potential weakness (Killian's dehiscence), through cricopharyngeus. ***Dahnert 5th 866*** (GI Reqs 2nd p30).
- Occur below the cricopharyngeus- F. Zenker's diverticula are pseudodiverticula and represent herniation of mucosa and submucosa. This occurs superior to the cricopharyngeus muscle (GI Reqs 22-23).
- Can contract due to the presence of a muscular wall- F. Only mucosa and submucosa herniate through the defect (GI Reqs 22-23).
- Are traction diverticula- F. Are pulsion diverticula. Traction diverticula result from fibrous adhesions following lymph node infection, such as TB, and contain all 3 esophageal layers. ***Dahnert 5th 757***

- **All these structures abut the caudate lobe except:**
  - IVC
  - Ligamentum venosum
  - Right lobe live
  - Left lobe liver
  - Ligamentum teres

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Ligamentum Teres

- IVC- T. The IVC is directly posterior to the caudate lobe *(BH 669)*.
- Ligamentum venosum- T. The ligamentum venosum is directly anterior to the caudate lobe (BH 669).
- Right lobe of liver- T. The caudate lobe is contiguous with the right lobe of the liver (BH 669).
- Left lobe of liver- T. Superior to the ligamentum venosum, the caudate lobe abuts the left liver lobe (Dähnert 562).
- Ligamentum teres- F. The ligamentum teres is the embryologic remnant of the obliterated umbilical vein. This structure is anteriorly located and runs into the ligamentum venosum, is not directly adjacent to the caudate lobe *(**Dähnert 5th 673-674**; Netter Atlas 270)*.

- **The most common cause of colovesicular fistula:**
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  - Diverticulitis
  - Lymphogranularium venereum
  - Ulcerative colitis
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- Diverticulitis- T. Can fistulize to the urinary bladder as well as small bowel or vagina ***Primer 2nd 285***
- Crohn's- F. Tends to affect the right colon, sparing the sigmoid and rectum. Long fistulous tracts tend to parallel the bowel lumen (Dähnert 670). Crohns is 3rd most common cause of fistula formation behind iatrogenic (instrumentation) and diverticulitis. (***Dahnert 5th 810***)
- Lymphogranuloma venereum- F. STD caused by Chlamydia trachomatis causing a non-specific granulomatous response. Starts at the rectum and may spread to the sigmoid and descending colon. Can fistulize to pericolic regions, rectum, and vagina. Urinary bladder not mentioned (Dähnert 699).
- UC- F. UC is a mucosal and sucmucosal disease and does not form fistulas (Dähnert 728).
- Cancer- F. Complicutions include obstruction, perforation, instussusception, pneumatosis, and pseudomyxoma peritonei. No fistulas (Dähnert 668).

- **In gallstone ileus:**
  - Two/thirds or more of patients you see pneumobilia
  - Most of the time you can see the gallstone on plain film
  - You need to a percutaneous transhepatic cholangiogram in order to identify the fistula
  - The most common location for the stone to stick is in the mid jejunum
  - It is most likely to erode into the transverse colon

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Gallstone ILeus

- 69% have pneumobilia
- Ectopic calcified gallstone in ~25%
- Fistula visible on barium UGI
- Ileum (TI) is most common site of obstruction (>90%)
- Erosion into duodenum in 60%

- ***Dahnert 5th 823-824***

- Rigler's Triad
  - Pneumobilia
  - SBO
  - Impacted gallstone-usually in the terminal ileum at ileocecal valve

- **Which is least likely to cause a gastric ulcer**
  - Zollinger Ellison
  - Helicobacter gastritis
  - Menetrier's

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- Menetrier's disease: Large gastric rugal folds (hypertrophic gastritis) with protein-losing enteropathy. Clinical triad: achlorhydria, hypoproteinemia, edema. Typically occurs in middle-aged men. Complication: gastric carcinoma, 10%. Not usually associated with ulcers. Radiographic features: Giant gastric rugal folds, usually proximal half of stomach; Hypersecretion: poor coating, dilution of barium; Gastric wall thickening; Small intestinal fold thickening due to hypoproteinemia
  - ***Dahnert 5th 847; Primer 2nd 163***
- Zollinger-Ellison- T. Gastrinoma causes ZE, and this results in multiple ulcers in the duodenum, stomach, and jejunum
  - ***Dahnert 5th 866***
- Helicobacter gastritis- T. 70% of benign gastric ulcers are caused by H. pylori
  - ***Dahnert 5th 830***.
- Menetrier's- F. Also known as hypertrophic gastritis, this condition is characterized by increased mucus production, hypoproteinemia, hypochlorhydria, and giant rugal folds in the proximal half of the stomach. Benign gastric ulcers are rare (Weissleder 163).

- **The origin of the superior hemorrhoidal artery**
  - Internal iliac
  - External iliac
  - IMA
  - SMA

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  - Internal iliac
  - External iliac
  - **IMA**
  - SMA

C. IMA

- The IMA originates at the L3 level and gives rise to 3 branches: left colic, sigmoid, and superior hemorrhoidal (rectal) arteries.
  - ***Netter 247, Dahnert 5th 781***
  - NB: Superior Hemorrhoidal Artery = Superior Rectal Artery

- **Pt with splenic vein thrombosis and bleeding gastric varices. You should do:**
  - Splenorenal shunt
  - Mesocaval shunt
  - Portocaval shunt
  - Spleno-? Shunt
  - Splenectomy

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- **What is assoc with <u>echinococcal</u> splenic cysts**
  - Wall trabeculation
  - Most are symptomatic by age 20
  - Are congenital cysts
  - Are due to trauma

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  - Are due to trauma

B. Most Are Symptomatic By Age 20

- Most are symptomatic by age 20- Probably T. Clinical manifestations are non-specific, but usually consist of abdominal pain, splenomegaly, and fever. No age is mentioned (Dachman, Radiology of the Spleen, 156-7).
  - Time to diagnosis 11-81 years, grow ~2-3cm/year
  - See ***Dahnert 5th 699-701*** for full discussion
- Wall trabeculation- F. These cysts contain a sharp marginal wall of reactive parenchyma (ectocyst) and multilocular internal structure (endocyst). Epidermoid cyst contains wall trabeculation. (Dachman, Radiology of the Spleen, 156).
- Are congenital cysts- F. Are due to Echinococcus granulosus. Epidermoid cysts are congenital (Webb, Fundamentals of Body CT, 165).
- Are due to trauma- F. Are due to echinococcus granulosus .
- Maybe questions should have been epidermoid cyst and the answer would have been trabeculated wall.

- **The changes in Cystic Fibrosis in the bowel in an adult is a risk factor for**
  - meconium ileus
  - SBO
  - Diverticulitis
  - Cancer

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  - meconium ileus
  - **SBO**
  - Diverticulitis
  - Cancer

B. SBO

- SBO- T. Adults can have bouts of low grade SBO whether or not they experienced meconium ileus as children. The adult form is called "meconium ileus equivalent" and symptoms include right lower quadrant pain, loss of appetite, occasionally with emesis and palpable mass (Harrison's 1450). Intussusception and volvulus are potential complications.
- Meconium ileus- F. This complication of CF is seen in neonates, as well as meconium peritonitis or intussusception (Weissleder 52).
- Diverticulitis- F. No mention of diverticulitis in any of my sources.
- CA- F. No mention of CA in any of my sources.

- ***Dahnert 5th 481-482, 811-812***

- **Regarding epidermoid cysts of the spleen (this may be recalled very imperfectely!)**
  - secondary to blunt trauma
  - contain proteinaceous contents
  - can be hyperdense on NECT
  - has a cuboidal cell lining
  - Septated

- **Regarding epidermoid cysts of the spleen (this may be recalled very imperfectely!)**
  - secondary to blunt trauma
  - contain proteinaceous contents
  - can be hyperdense on NECT
  - has a cuboidal cell lining
  - **Septated**

Septated and contain protein

- Septated- T. Peripheral septations are present in 86% of cases.
- Secondary to blunt trauma- F. These are congenital cysts which are caused by infolding of the peritoneal mesothelium.
- Contain proteinaceous contents- F. These cysts may contain cholesterol, fat, or blood. This could be true too.
- Can be hyperdense on NECT- F. These cysts have the same appearance as post-traumatic cysts, and are hypodense (BH 703).
- Has a cuboidal lining- F. A mesothelial or squamous epithelium is present.

- ***Dahnert 5th 701***

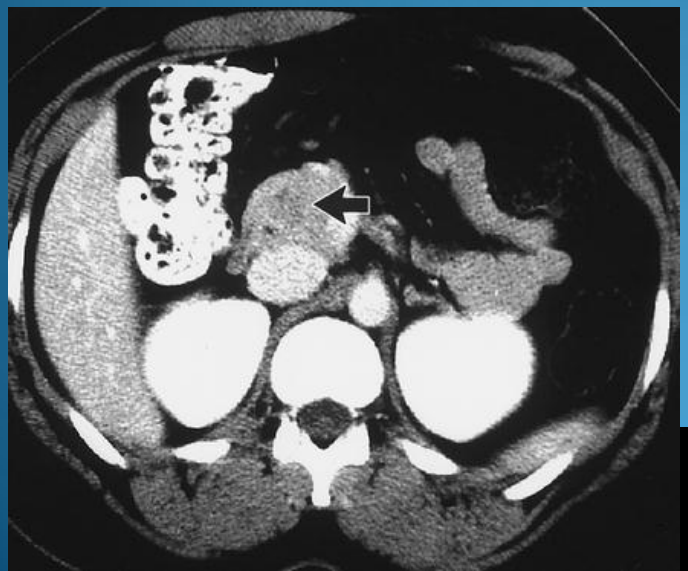
- **Solid and papillary tumors of the pancreas are most associated with:**
  - Young women.
  - Head of pancreas.
  - Benign lesion.
  - Lack of calcification
  - Hypervascular
  - Homogeneously hypoechoic

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A. Young Women

- Young women- T. The mean age of patients is 25 years, and the female:male ratio is 9:1
- Head of pancreas- F. Solid and papillary tumors of the pancreas typically are located in the tail
- Benign lesion- F. These masses have metastatic potential, but are low-grade. Targets include lymph nodes, omentum, and the liver.
- Calcification – F: 33% have stippled/punctuate/ or amorphous calcification
- Hypervascular – F: lesion are hypovascular with no contrast enhancement sometimes see ehnancement of solid tissue projecting toward center of mass
- Hypoechoic – F: lesions are echogenic with a necrotic center
- ***Dähnert 5th p738***

- Synonyms include **solid** and cystic tumor, **solid** and **papillary** epithelial neoplasm, **papillary**-cystic neoplasm, **papillary** cystic epithelial neoplasm, **papillary**-cystic tumor, and Franz tumor. In 1996, the World Health Organization (WHO) renamed this tumor as SPT for the international histologic classification of tumor of the exocrine **pancreas**
- This uncommon, typically benign tumor is found mainly in young non-Caucasian women between the 2nd and 3rd decades of life
- Although most SPTs exhibit benign behavior, malignant degeneration does occur
- CT usually demonstrates a well-encapsulated lesion with varying **solid** and cystic components owing to hemorrhagic degeneration (8). Following contrast material administration, enhancing **solid** areas are typically noted peripherally, whereas cystic spaces are usually more centrally located
-



- **Cause for hyperdense liver on CT scanning.**
  - Amiodarone
  - Fatty liver
  - Amyloid
  - Cyclophosphamide toxicity

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A. Amiodarone

- Amiodarone- T. Amiodarone consists of 37% iodine by weight and is a cause of hyperdense liver parenchyma on CT
  - ***Dähnert 5th p657-658.***
- Fatty liver- F. Fatty liver decreases attenuation (Dähnert 583, years of personal study).
- Amyloid F. Amyloid deposition causes hepatosplenomegaly. However, there is no mention of density change (Weissleder 173).
- Cyclophosphamide toxicity- F. Conversely, chemotherapy tends to decrease liver attenuation. Cyclophosphamide toxicity is primarily pulmonary, causing a basal reticular pattern (BH 484; Weissleder 249). Fatty liver – ***Dahnert 5th 702***
- Mnemonic: **GG CHAT: G**old therapy, **G**lycogen storage disease, **C**yclophosphamide, **H**emochromatosis/ Hemosiderosis, **A**miodarone, **T**horotrast.
  - ***Dahnert 5th 658***

- **Which of the following is *not* a hypervascular metastases within the liver?**
  - Carcinoid
  - Thyroid
  - Renal
  - Bronchogenic carcinoma
  - melanoma

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  - Thyroid
  - Renal
  - **Bronchogenic carcinoma**
  - melanoma

D. Bronchogenic Carcinoma

- Bronchogenic carcinoma- F. Metastases from bronchogenic carcinoma are hypovascular *(Weissleder 249)*.
- Carcinoid- T. Hypervacular liver metastases.
- Thyroid CA- T. You guessed it, thyroid CA mets are also hypervascular (Weissleder 249).
- RCC- F. RCC mets are hypervascular, although may become iso-dense on contrast CT.
- Melanoma- T. Melanoma metastases are hypervascular, and would be hyperdense on contrast CT.

- ***Dahnert 5th 720-721***

- **Least likely malignancy to metastasize to the liver**
  - Bronchogenic carcinoma
  - Melanoma
  - Breast
  - Thyroid
  - Renal ca

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  - Bronchogenic carcinoma
  - Melanoma
  - Breast
  - **Thyroid**
  - Renal ca

D. Thyroid Ca

- Thyroid CA- T. Thyroid does not usually metastasize to the liver. Prostate CA and skin cancers also have a low likelihood of spreading to the liver *(Harrison's 580)*.
  - Most thyroid cancers (excluding medullary) spread hematogenously to the lungs and bone ***Dahnert 5th 395-396***
- Bronchogenic carcinoma- F. Commonly metastasizes to the liver. Also tends to spread to lymph nodes, adrenal glands, bone, and brain, as well as the contralateral lung (BH 394).
- Melanoma- F. Melanoma commonly metastasizes to the liver. Interestingly, melanoma is the most common to metastasize to breast (Harrison's 580; Weissleder 670).
- Breast- F. Breast commonly metastasizes to the liver. Also spreads to skin, lymph nodes, lungs, bones, and CNS (Harrison's 1848).
- RCC- F. RCC liver mets are common, seen in approximately 33% of cases (Dähnert 5th 950).

- **A three cm hemangioma of the liver is most likely to have this appearance.**
  - posterior acoustic enhancement
  - irregular margins
  - hypoechoeic
  - doppler flow centrally

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  - irregular margins
  - hypoechoeic
  - doppler flow centrally

A. Posterior Acoustic Enhancement

- Posterior acoustic enhancement- T. Posterior acoustic enhancement is common, even in hypoechoic lesions *(Weissleder 201)*.
- Irregular margins- F. The classic US appearance of a cavernous hemangioma is well-defined, echogenic mass (BH 835).
- Hypoechoic- F. Classically echogenic lesions (BH 835).
- Doppler flow centrally- F. Doppler usually demonstrates no central flow.

- ***Dahnert 5th 710; US Reqs 2nd 53-56***

- **Complications of liver transplant include the following EXCEPT…**
  - GVHD
  - Hepatic venous occlusive disease
  - Pancreatitis
  - Splenic abscess
  - Adrenal hemorrhage

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  - GVHD
  - Hepatic venous occlusive disease
  - Pancreatitis
  - Splenic abscess
  - Adrenal hemorrhage

A. GVHD

- GVHD – F- : Liver transplants can be rejected but it is not due to GVHD. GVHD is specific description for the T lymphocytes from DONOR BONE MARROW causing selected epithelial damage of RECIPIENT targed organs. Occurs in 30-70% pts w/ allogeneic bone marrow txplt when immune-competent cells from donor react against immune-incompetent tissues or recipient
- Hepatic venous occlusive disease – T – aka Budd-Chiari (5p's PNH, plts, pill, pregnancy, polycythemia rubra vera), also caused by injury to vessel wall which I would think inherent in a transplant surgery(Dähnert 5th p683 and 718) and listed as a complication in (***Primer 2nd p206***)
- Pancreatitis - T- common postoperative especially kids – for more specifics medline search of liver TX and pancreatitis yields pages of results – ***Dahnert 5th 728*** (post-surgical – I think transplant qualifies!)
- Splenic abscess – T - CT findings post liver transplant include abscesses including splenic (***Primer 2nd p207***)
- Adrenal hemorrhage: occurs more commonly in neonates than adults. Listed specifically with orthotopic liver transplantation in (***Dähnert 5th p909***) Causes: severe trauma, shock, post-op – all these essentially inherent in liver transplant (Weissleder, p296)

- **Bone marrow transplant least likely to be associated with:**
  - Hepatoveno occlusive disease
  - Graft-versus-host disease
  - Adrenal hemorrhage
  - Splenic abscess
  - CMV pneumonia

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  - **Adrenal hemorrhage**
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C. Adrenal Hemorrhage

- Hepatoveno occlusive disease- T- can get Budd-Chiari due to immunosuppressive drugs in patients with BMT ***Dähnert 5th683***
- Graft-versus-host disease –T - GVHD is specific description for the T lymphocytes from DONOR BONE MARROW causing selected epithelial damage of RECIPIENT targed organs. Occurs in 30-70% pts w/ allogeneic bone marrow txplt when immune-competent cells from donor react against immune-incompetent tissues or recipient
  - ***Dahnert 5th 829***
- Adrenal hemorrhage – F - Could not find specific reference for or against this one
- Splenic abscess- T – fungal microabscesses in immunocompromised patients ***Dahnert 5th 670***
- CMV pneumonia- T – listed as early phase pulmonary complication (up to 100 days after tx) of BMT ***Dähnert 5th 462***

- **Most reliable indicator of portal hypertension:**
  - Retrograde flow in the splenic vein.
  - Slow flow in the splenic vein.
  - Absence of flow in the splenic vein.

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A. Retrograde Flow In The Splenic Vein

- Sonographic findings: enlarged PV, splenomeg, ascites; portosystemic collaterals is the most specific sign, easiest to detect is recanalized paraumbilical vein that runs thru lig teres and communicates with umb segment of left portal vein bet medial and lat segments of left lobe. Next easiest to see is coronary vein behind the left lobe extending superiorly from splenic vein, normally has flow directed into splenic v but may have flow directed away from splenic v in pts w/ portal HTN. "reversed flow in any tributary of the portal or splenic vein is a sign of portal HTN." (***US Requisites 2nd 72-74***).

- **Regarding portal venous pressure:**
  - Equals wedged hepatic pressure.
  - Equals hepatic vein pressure.
  - Equals hepatic vein pressure minus hepatic wedge pressure.
  - Equals hepatic wedge pressure minus hepatic vein pressure.

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  - Equals wedged hepatic pressure.
  - Equals hepatic vein pressure.
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  - Equals hepatic wedge pressure minus hepatic vein pressure.

?

- The hepatic venous-pressure gradient (HVPG) is an accurate estimate of portal venous pressure. The HVPG is determined angiographically by subtracting the free hepatic venous pressure from the hepatic venous wedge pressure.

- **There is a noncalcified 2 cm colonic polyp. The risk that this is a malignancy or the chance that this is a malignancy is:**
  - 0%
  - 10%
  - 50%
  - 90%

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  - 0%
  - **10%**
  - 50%
  - 90%

B. 10%

- An adenomatous polyp measuring < 5 mm has a 0% chance of malignancy. 5-9 mm equals 1% chance. 10-20 mm = 10% chance. > 20 mm = 46% chance of malignancy. It is recommended that all polyps greater than 10 mm be removed. The patient may have a synchronous adenoma 50% of the time. Metachronous adenoma is seen 30-40% of the time. Synchronous adenocarcinoma is seen 1.5-5% of the time. Metachronous adenocarcinoma is seen 5-10% of the time. Most are asymptomatic *References: B&H p.754,* ***Dähnert 5th 787***

- **Patient status post laparoscopic cholecystectomy. Now with right upper quadrant pain and ultrasound showing two echogenic calculi within the common duct. What is the best choice:**
  - ERCP with papillotomy
  - Chemo dissolution
  - Lithotripsy.
  - Open cholecystectomy/stone removal
  - Other choices not well remembered.

- **Patient status post laparoscopic cholecystectomy. Now with right upper quadrant pain and ultrasound showing two echogenic calculi within the common duct. What is the best choice:**
  - **ERCP with papillotomy**
  - Chemo dissolution
  - Lithotripsy.
  - Open cholecystectomy/stone removal
  - Other choices not well remembered.

- ERCP: Patients with common duct stones who have had a previous cholecystectomy are best treated by endoscopic sphincterotomy. The opening created in the sphincter permits stones to pass from the duct into the duodenum. Endoscopic sphincterotomy is unlikely to be successful in patients with large stones (>2cm), and it is contraindicated in the presence of stenosis of the bile duct proximal to the sphincter. Endoscopic removal of large impacted stones may be facilitated by preliminary lithotripsy. (Current Surgical Diagnosis and Treatment P557) and Harrisons 13th e, p 1513 [1994])
- Since it was first described in 1974, endoscopic sphincterotomy has been the procedure of choice for management of choledocholithiasis, especially for retained common bile duct stones. emedicine
  - Endoscopic management of choledocholithiasis: To cut, stretch or relax?
  - Journal of Gastroenterology and Hepatology

- **Which process is most likely to be responsible for lymphoid hyperplasia of the small bowel**
  - dysgammaglobinemia
  - Crohn's disease
  - Sprue
  - Scleroderma
  - Peptic ulcer disease

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  - **dysgammaglobinemia**
  - Crohn's disease
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  - Scleroderma
  - Peptic ulcer disease

Dysgammaglobulienmia

- AJR

LYMPHOID HYPERPLASIA OF THE LARGE INTESTINE ASSOCIATED WITH DYSGAMMAGLOBULINEMIA*

A patient with dysgammaglobulinemia is reported who had hepatosplenomegaly, thrombocytopenia, and roentgenographic demonstration of nodularity of the large bowel subsequently proved to be due to nodular hyperplasia.

Multiple nodular polypoid mucosal lesions of the large bowel may be, as they are in the small intestine, indicative of underlying dysgammaglobulinemia.

- Although **lymphoid hyperplasia** of the small bowel and colon may be associated with a variety of conditions (including hypogammaglobulinemia, giardiasis, inflammatory bowel disease, and lymphoma), the development of gastric **lymphoid hyperplasia** is almost always thought to be mediated by a specific immune response to *H. pylori*
  - ***Lymphoid Hyperplasia*** *of the Stomach; AJR*

[redacted]

Diffuse nodular lymphoid hyperplasia

Diffuse nodular lymphoid hyperplasia of the small bowel is usually seen with humoral immunodeficiency. Cellular immune function is intact, as the follicles of lymphoid tissue contain T cells. Diarrhoea, steatorrhoea and growth retardation may be early manifestations. The mucosal nodules are small, generally no more than 3 mm in diameter. Radiology demonstrates their presence throughout the small bowel, often extending into the right colon. Long-term prognosis in such patients appears to include a significant risk of the development of carcinoma (Walker-Smith et al. 1983).

Diseases of the small intestine in childhood By John A. Walker-Smith, Simon Murch

5.5. NODULAR LYMPHOID HYPERPLASIA

Nodular lymphoid hyperplasia refers to a condition in which numerous lymphoid nodules are found in the small intestine, large intestine, or both *(120)*. Histologically, the nodules are enlarged lymphoid clusters with germinal centers in the lamina propria or submucosa *(120)*. Lymphoid hyperplasia occurs most frequently in individuals with immune deficiencies such as common variable immune deficiency (CVID) or the AIDS *(105,121)*. Nodular lymphoid hyperplasia can also occur in individuals without immune system dysfunction, and might be identified at as many as 3% of autopsies *(105)*. In most cases, nodular lymphoid hyperplasia is asymptomatic, but it can be associated with diarrhea and malabsorption *(105,122)*.

Endoscopic oncology By Douglas O. Faigel, Michael L. Kochman pg 203

[redacted]

- Normal lymphoid nodules are 1-3 mm and can be seen in the colon normally.
- Lymphoid hyperplasia is found in 1) nl variant in 13% of BE's, (esp kids in the TI where lymphoid tissue is most abundant) 2) self-limiting local/systemic inflamm/infxn/allergy 3) may be related to immunodef/dysgammaglobulinemia w/ SB involvement.

- Location is primarily jejunum but may involve entire SB, asc colon & hep flexure, seldom in sigmoid/rectum. Mucosa studded w/ innumerable 1-3 mm small uniform polypoid lesions, may be umbilicated (uncommon) SB folds are nl when no underlying disease, may see fold thickening in pts w/ Ig deficiency or giardiasis. There has been suggestion that lymphoid hyperplasia may represent the earliest changes of IBD or lymphatic disease but this is, according to Requisites, "quite speculative and has never been proved." *(**Dähnert 5th p841**, GI Requisites, p115-16, 256-57)*

- Intestinal lymphoid hyperplasia (ILH) is an uncommon but well-recognized cause of recurrent intussusception in infants and young children. It is characterized by numerous hyperplastic lymphoid nodules underneath the surface epithelium, within the lamina propria and the submucosa of the gut.5,6 These nodules form polyp-like lesions that protrude from the intestinal wall into the lumen and can be detected both on endoscopy,5–7 and by double-contrast barium enema.2,3,8 The cause of ILH is still uncertain. It has been reported in association with viral, bacterial, or parasitic infections, as well as an allergic response to various foods.4,5,9,10 In adults, more frequently then in the children, it has been reported to occur in association with immune deficiencies such as acquired idiopathic hypogammaglobulinemia11,12 or human immunodeficiency virus infection.13
- PEDIATRICS Vol. 111 No. 3 March 2003, pp. 682-685.

Lymphoid Hyperplasia

- Early sign of Crohn's hyerplasia of lymphoid follicles in the lamina proper, associated with shallow 1-3 mm mucosal erosions surrounded by a small halo of edema also known as aphthoid ulcers (gore and Levine 783)
- Ileal lymphoid hyperplasia occurs more frequently in pts with FAPS than in the general population. Gross appearance is similar to that of adenomas. However, lymphyoid hyperplasia has no apparent clinical significance in these patients (Gore and Levine 1191)
- Common Variable Immunodeficiency Syndrome- Nodular Lymphoid Hyperplasia (NLH) is aa frequent finding in CVI. It can extend through much of the small bowel and may involve the colon. Nodules are slightly larger than in the self limited lymphoid nodular hyperplasia of childhood and adolescence and may be more widely distriuted. **Clinical Imaging of the Small Intestine By Hans Herlinger, Dean D. T. Maglinte, Bernard A. Birnbaum, Emil J Balthazar pg 320**

Bad recall ?

- **Patient presents with thickening of the cecum, what clinical information would most make you think of typhlitis**
  - Pt is immunocomprimised
  - Pt is on antibiotics
  - Pt is on chemo
  - Pt has history of lymphoma

[redacted]

- **A. Immunocompromised, but lymphoma or chemo could also be correct**
- Could be any of the choices but from many old recalls immunocimpromised is the best answer – I wonder about the accuracy of the other recalled answer choices. Ileocecal syndrome, neutropenic colitis aka typhlitis. Acute inflamm of cecum, appx and occas TI, initially described in kids w/ leukemia and severe neutropenia. Causes: leukemic/lymphomatous infiltrate, ischemia, focal pseudomembraneous colitis (abx use), infxn. Predisposed: common in childhood leukemia, aplastic anemia, lymphoma, immunosuppressive tx, clinical AIDS; Location: cecum and asc colon, appx and distal ileum may be secondarily involved. CT is preferred exam – circumferential wall thick, bowel wall edema, pericolonic inflammation, +/- pericolonic fluid and intramural pneumatosis. DDx: 1) leukemic/lymphomatous deposits, appy w/ periappendiceal abscess, diverticulitis, IBD.
- ***Dähnert 5th p863***
- **Pt on chemo or with lymphoma or immunocompromised are all associated with typhlitis.** - SFH

[redacted]

- **Which organ is less likely responsive to glucagon injection?**
  - Esophagus
  - Stomach
  - Duodenum
  - Small bowel
  - Large bowel

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  - **Esophagus**
  - Stomach
  - Duodenum
  - Small bowel
  - Large bowel

A. Esophagus

- Glucagon is a useful hypotonic agent for the stomach and duodenum w/ no effect on esophageal peristalsis. It does relax the LES and increases the freq of reflux. (Levine, Double Contrast GI Radiology, p 48)
- Hypotonic effect on duodenum> jejunum > stomach > colon
- ***Dähnert 5th p779***

- **Which does *not* affect pancreatic secretions:**
  - Secretin
  - Cholecystokinin
  - Glucagon
  - Gastrin

- **Which does *not* affect pancreatic secretions:**
  - Secretin
  - Cholecystokinin
  - **Glucagon**
  - Gastrin

C. GLUCAGON

- Glucagon – F - : produced in islet cells of pancreas and target organ is intestines
- Secretin – T - : produced in duodenal mucosa; released by H+ with pH < 4.5. In pancreas: increases alkaline pancreatic secretions, weakly stimulates enzyme secretion, stimulates insulin release
- CCK – T - : produced in duodenal & upper intestinal mucosa; released by FA, some aa's, H+ In pancreas: simulates secretion of pancreatic enzymes (Pancreozyman), stin bicarb secretion (partly via secretin effect), stim insulin release
- Gastrin – T - : produced in antral cells and G cells of pancreas; release mediated by neuroendocrine cholinergic reflexes. In pancreas: strong increase in enzyme output, weakly stim fluid and bicarb output, stim insulin releaseInformation

- ***Dahnert 5th 779-780***

- **Concerning GI bleeding**
  - Permanent occlusion is the preferred method with coils for Colonic bleed
  - Selective vasopressin has same efficacy as IV vasopressin
  - Hemorrhagic gastritis has good results with vasopressin
  - PUD has good results with vasopressin

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  - **Hemorrhagic gastritis has good results with vasopressin**
  - PUD has good results with vasopressin

C. Hemorrhagic Gastritis Has Good Results With Vasopressin

- Intra-arterial vasopressin successfully controls bleeding from hemorrhagic gastritis in 84%, with recurrences in 16%. Control of colorectal bleeding is successful in 80-100% w/recurrence in up to 25%. *(Kadir, pp61-3)***a. F**:
- The main indications for intra-arterial vasopressin infusion are colonic diverticular bleeding, diffuse mucosal hemorrhage (hemorrhagic gastritis, inflammatory lesions), or failed IV infusion, and also SB lesions not accessible to embolization. **d. F**: PUD: embolization is the primary tx from bleeding from peptic ulcers and other UGI sources *(Gore& Levine 1994 p2529)*
- Intra-arterial vasopressin infusion is an ineffective treatment for bleeding from ulcer disease, but it is effective in controlling bleeding from hemorrhagic gastritis. *emedicine*

- **Which of these does not present as a cavitary small bowel lesion:**
  - melanoma
  - lymphoma
  - adenoCA
  - leiomyosarcoma

- **Which of these does not present as a cavitary small bowel lesion:**
  - **melanoma**
  - lymphoma
  - adenoCA
  - leiomyosarcoma

Melanoma

- Dahnert “Cavitary Small Bowel Lesions”
  - Lymphoma
  - Leiomyosarcoma
  - Primary Adenocarcinoma
  - Metastases (especially melanoma)
- So all are correct, maybe recalled incorrectly. But melanoma is the least likely.

- **Which one of the following is least likely to be ischemic?**
  - sigmoid
  - cecum
  - hepatic flexure
  - splenic flexure
  - rectum

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  - sigmoid
  - cecum
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  - splenic flexure
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E. Rectum

- Location: left colon 46-90%, all colon 11%, right colon 30%, transverse 9%, sigmoid 4%, **rectum spared**. Most commonly affected segments: (watershed areas)
  - Griffith point(80%) – jx SMA/IMA – splenic fx.
  - Point of Sudeck – jx IMA/hypogastric – rectosigmoid jx
- ***Dähnert 5th 837; Primer 2nd 190-191***

- **Regarding angiodysplasia which is *false*:**
  - majority seen in elderly
  - usually see active bleeding on Angio
  - early draining of ileocolic vein seen
  - predominantly R-sided
  - increased arterial vessels on antimesenteric border

- **Regarding angiodysplasia which is *false*:**
  - majority seen in elderly
  - **usually see active bleeding on Angio**
  - early draining of ileocolic vein seen
  - predominantly R-sided
  - increased arterial vessels on antimesenteric border

B. Usually See Active Bleeding On Angio

- a. T: majority > 55
- b. F: see "arterial tuft" = cluster ov vessels during arterial phase but "contrast extravasation is unusual"
- c. T: see early opacification of draining ileocolic vein and a densely opacified dilated tortuous ileocolic vein into late cenous phase
- d. T: Majority are cecum and ascending colon
- e. T: see cluster of vessels during arterial phase along antimesenteric border – see the "arterial tuft" (a –e all from Dähnert 5th p792)

- ***Dahnert 5th 792***

- **A patient presents with hypotension and hematemesis. What is the next choice?**
  - Angiography
  - Endoscopy
  - CT scan

- **A patient presents with hypotension and hematemesis. What is the next choice?**
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  - **Endoscopy**
  - CT scan

B. Endoscopy

- Patients with significant upper gastrointestinal bleeding have bright red or coffee ground hematemesis or melena. About 75% of patients with acute GI bleeding respond to supportive measures and minor blood transfusions.After resuscitaton and NG tube placement, endoscopy is used to identify and possibly treat the source of bleeding. Imaging is only carried out when the bleeding site cannot be identified or catheter directed treatment is contemplated.However, continuous rapid bleeding is signaled by passage of large amounts of blood, transfusion of greater than 4-6 units of blood in 24 hr, or hemodynamic instability. These patients should undergo angiographic evaluation. (Valji, Vascular and Interventional Radiology, p. 192.)

1998

- **Concerning pancreatic islet cell tumors which is true:**
  1. Metastasis to the liver is hypervascular
  2. 50% insulinomas are malignant
  3. Gastrinoma may be intra and extra pancreatic

1998

- **Concerning pancreatic islet cell tumors which is true:**
  1. Metastasis to the liver is hypervascular- True
  2. 50% insulinomas are malignant- False
  3. Gastrinoma may be intra and extra pancreatic- True

- **1=T 2=F 3=T**
- 1= T. Most islet cell tumors tend to be hypervascular.
  - ***Dahnert 5th 659***
- 2 = F. Malignant potential 10% insulinoma; 60% gastrinoma; 80% glucagonoma.
  - ***Dahnert 5th 725***
- 3 = T. Gastrinoma – 87% in pancreas, 7-33% ectopic (duodenum, peripancreatic nodes, spleen, stomach, jejunum, omentum, retroperitoneum, ovary)
  - ***Dahnert 5th 725***

- **Pt. comes in with nonobstructing freely mobile mass in the ileum.**
  a. Adenocarcinoma
  b. Leiomyosarcoma
  c. Metastasis
  d. Carcinoid
  e. Lymphoma

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Carcinoid

- Malignant Small Bowel Tumors
  - Carcinoid (46-48%)
  - Lymphoma (16-17%)

- **E. Lymphoma.**
- Lymphoma affects the small bowel more often than any other portion of the GI tract. Ileum most common portion involved due to the predominance of lymphoid tissue there. Non-Hodgkin's lymphoma more common than Hodgkin's. Solitary or multiple focal mural masses can be seen in addition to the usually appearance of fold thickening, luminal narrowing, aneurismal dilatation, diffuse nodularity, and extrinsic compression by mesenteric masses. With continued enlargement these masses may become exoenteric, undergo excavation and ulceration, or endoenteric, producing an intraluminal polypoid mass with the potential for intussusception. *GI Requisites*, 2nd, 117
- ***Dahnert 5th 840-842, 788, 801-802***

- **Pt. with pancreatic VIPoma most likely to present with:**
  a. Necrolytic erythema migrans
  b. Hyperchlorhydria
  c. Hypokalemia

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C. hypokalemia.

- VIPoma (vasoactive intestinal peptide). WDHA syndrome (Watery diarrhea, Hypokalemia, Achlorhydria) Causes hypokalemia due to loss of bicarb and K+ into the gut.
- 50-80% malignant
- Small cell CA of lung and neuroblastoma may cause similar symptoms (paraneoplastic syndromes)
- ***Dahnert 5th 726***
- Necrolytic erythema migrans - glucagagonoma

- **True/False**
  - 50% of insulinomas are malignant-
  - Glucogonaomas most commonly present with increased gastric acid secretion
  - Gastrinomas can be found outside the pancreas
  - Liver metastases of islet cell tumors are typically hypervascular

- **True/False**
  - 50% of insulinomas are malignant- False
  - Glucogonaomas most commonly present with increased gastric acid secretion- False
  - Gastrinomas can be found outside the pancreas- True
  - Liver metastases of islet cell tumors are typically hypervascular- True

1=F 2=F 3=T 4=T

- 10% of Insulinomas are malignant.
- Gastrinomas most commonly present with increased gastric acid secretion;
- Glucogonomas present with diarrhea, diabetes, glossitis, necrolytic erythema migrans. Have 80% transformation.
- Gastrinomas can occur in stomach, duodenum, etc.
- Islet cell tumors and its mets are HYPERvascular.
- ***Dahnert 5th 720-721, 724-726***

- **71 y/o female with a large, low-attenuation pancreatic head mass with central calcification. Lesion has not changed in 5 years.**
  - islet cell tumor
  - pancreatic ductal adenocarcinoma
  - microcystic adenoma
  - macrocystic adenocarcinoma
  - solid and papillary tumor

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  - islet cell tumor
  - pancreatic ductal adenocarcinoma
  - **microcystic adenoma**
  - macrocystic adenocarcinoma
  - solid and papillary tumor

C. Microcystic adenoma

- A microcystic adenoma is usually serous, benign, prefers the pancreatic head, has 1-20mm cysts, and a calcified stellate scar. It is hypervascular, and usually occurs in >60y/o.
- A macrocystic adenocarcinoma is mucinous, prefers the body and tail, has >20mm cysts, occurs 40-60y/o, has papillary excrescences, and is hypovascular. Macrocystic lesions may be benign or malignant, but all must be removed because benign ones can transform.
- Islet cell tumors are aggressive, and may secrete gastrin, glucagon, insulin, somatostatin, but may be non-functional. Part of MEN-I. Metastasizes to liver.
- Pancreatic ductal adenocarcinoma – most common pancreatic tumor, preferentially affects the head – very aggressive with poor prognosis. *Primer, 3rd, 240-241*
- ***Dahnert 5th 718-719, 721, 723-726***

- **In patients undergoing laparoscopic cholecystectomy, the most common cause of bile leak is:**
  - Aberrant anatomy
  - Improperly positioned surgical clip

- **In patients undergoing laparoscopic cholecystectomy, the most common cause of bile leak is:**
  - Aberrant anatomy
  - **Improperly positioned surgical clip**

B. Improperly positioned surgical clip.

- "Bile leaks tend to occur due to incomplete clipping of the cystic duct stump. Duct transections and lacerations usually occur because of failure to identify the cystic artery and cystic duct correctly. Therefore, common hepatic duct and hepatic artery may be transected and/or clipped inadvertently." *Ref: Laberge, et al, SCVIR Syllabus Biliary Interventions, 1995, p. 234 Davidoff AM, et al. Clinical features and mechanisms of major laparoscopic biliary injury. Semin Ultrasound CT MR. 1993 Oct;14(5):338-345*

- **Pt. with Whipple's, what is the most likely associated CT finding**
  - Low density para-aortic lymph nodes
  - Scattered calcifications in the liver
  - Hyperdense spleen

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  - **Low density para-aortic lymph nodes**
  - Scattered calcifications in the liver
  - Hyperdense spleen

A. Low density para-aortic lymph nodes.

- Whipple's is a rare multisystem disease. Organs primarily involved: SI joints, joint capsule, heart valves, CNS, jejunem. Radiographic features: micornodules in jejunem, no dilatation or increased secretions, nodal masses in mesentery, sacroileitis. *Primer*, 3rd, 184; ***Dahnert 5th 659-660, 865***

- **Regarding focal fatty infiltration of the liver: (T/F)**
  - located around GB fossa
  - does not displace vessels
  - hyperechoic on US
  - hyperattenuation of CT confirms disease of lesion that is hyperechoic on US

- **Regarding focal fatty infiltration of the liver: (T/F)**
  - located around GB fossa- True
  - does not displace vessels- True
  - hyperechoic on US-True
  - hyperattenuation of CT confirms disease of lesion that is hyperechoic on US- False

1=T 2=T 3=T 4=F

- There are two forms of hepatic steatosis: diffuse and focal.
  - Diffuse: Most commonly caused by alcohol and diabetes. Chemotherapy is another important cause; the complete list is long.
  - Focal: caused by vascular insult. Wedge-shaped, peripheral. No mass effect. Echogenic on US, low density on CT, high signal on T1 and T2 (but drops out on fat-sat). Areas of unusual blood supply are more prone: subcapsular region, caudate lobe, GB fossa. *Primer, 3rd, 207-208*
    - **US Reqs 2nd, pg 68 and Dahnert 5th 702**: GB fossa usually a site of sparing of fatty infiltration
    - ***Dahnert 5th 702-703, US Reqs 2nd 68***

- **What is the least likely complication from pancreatic biopsy?**
  a. Hematoma
  b. Hemorrhage
  c. Pancreatic-cutaneous fistula
  d. Abscess
  e. Seeding of the tract

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E. seeding of the tract.

- a = Hematoma:
- b = Hemorrhage: 3% in pancreas tx bx.
- c = Pancreatic-cutaneous fistula:
- d = Abscess:
- **E** = Seeding of the tract: very rare. 23 cases seeding, 10 of 23 from bx malignancy.*(Diagnostic Ultrasound. 2nd ed. Rumack et al., p. 608; Pancreatic Transplant biopsy. Radiology 201(3): Dec. 1996. Trenkner, Walsh.)*
- ***Valji 388-389***
- ***Radiology***

Biopsy of Inoperable Pancreatic Tumors Does Not Adversely Influence Patient Survival Time[1]

- **Large cavitary mass is noted in the distal ileum on SB follow through.**
  a. Adenocarcinoma
  b. Leiomyosarcoma
  c. Metastasis
  d. Amebiasis
  e. Lymphoma

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  a. Adenocarcinoma
  b. Leiomyosarcoma
  c. Metastasis
  d. Amebiasis
  e. Lymphoma

B. Leiomyosarcoma

- Usually >6cm, large necrotic center, 40% in ileum

- E. Lymphoma (also a good answer)
  - Endoexenteric mass: large mass with small intramural component, may have ulcer

- A. Adenocarcinoma: usually annular stricture (60%); sessile mass (41%); ulcerated mass (27%); uncommon in ileum

- ***Dahnert 5th 840-842; 788***

- **What can be seen with leiomyosarcoma of the stomach?**
  a. Necrosis and cystic areas can be seen on CT with large tumors
  b. Typically mucosal polypoid mass
  c. Worse prognosis than gastric carcinoma

- **What can be seen with leiomyosarcoma of the stomach?**
  - **a. Necrosis and cystic areas can be seen on CT with large tumors**
  - b. Typically mucosal polypoid mass
  - c. Worse prognosis than gastric carcinoma

A. Necrosis and cystic areas can be seen on CT with large tumors.

- Necrosis and cystic areas can be seen on CT with large tumors. Typically mucosal polypoid mass: large intramural pedunculated mass but not mucosal polypoid mass. Submucosal, subserosal or exophytic mass, ulcerated overlying mucosa.
- Survival is poor but not as bad as in gastric ca: 5-18% overall 5 yr survival, mean survival 7-8 mos for gastric ca.
- ***Dahnert 5th 840***; *Fundamentals of Diagnostic Radiology. Brant & Helms, p. 728.) GI Requisites, 2nd, 116-117*

- **Matching**:
  A. HIV
  B. Candida
  C. NG tube
  D. tuberculosis

  1, pseudodiverticulosis
  2. large ulcer
  3. long stricture
  4. traction diverticulum

- **Matching**:
  A. HIV- large ulcers
  B. Candida- psuedodiverticulosis
  C. NG tube- long stricture
  D. tuberculosis- traction diverticulum

1=B 2=A 3=C 4=D

- Pseudodiverticulosis is dilated mucus glands which appear as small outpouchings of the esophageal lumen. It results from any severe esophagitis, particularly candida esophagitis. ***Dahnert 5th 819, 821***
- Large ulcers are most commonly the result of peptic disease and reflux, but viral infections such as herpes and CMV can also cause large ulcers. HIV patients are at risk for CMV esophagitis. ***Dahnert 5th 822-823***
- Long strictures result from congenital stenosis, post-surgical strictures, caustic agents, reflux, intubation, radiation, and candida esophagitis. ***Dahnert 5th 758***
- Traction diverticulum = interbronchial diverticulum. Contains all three esophageal layers. Results from fibrosis of adjacent lymph nodes, as in TB. ***Dahnert 5th 757***
- CMV esophagitis most commonly results in superficial ulcers that may become confluent to form large ulcers. This is seen most commonly in HIV patients. Candida causes dysphagia, longitudinal plaques ("cobblestoning"), shaggy contour, narrowed lumen, strictures, and "intramural diverticulosis", which I think is another name for pseudodiverticulosis. Although candida would be a decent answer, intubation is the more classic association with a long stricture. *GI Requisites, 2nd, 14-19, 32*

- **Concerning hernias:**
  1. **Spigelian**
  2. **Richter**
  3. **Paraduodenal**
  4. **Obturator**

  a. only one side of bowel wall involved
  b. congenital and diaphragmatic
  c. semilunar line
  d. with flexion and adduction of the leg there is pain in the lower extremity
  e. inferior mesenteric vein

- **Concerning hernias:**
  1. Spigelian- semilunar line
  2. Richter- only one side of bowel wall involved
  3. Paraduodenal- inferior mesenteric vein
  4. Obturator- with flexion and adduction of the leg there is pain in the lower extremity

1=C 2=A 3=E 4=D

- Spigelian: external hernia, hernia through internal oblique, beneath external oblique at lateral margin of rectus sheath (at junction of semilunar and arcuate lines).
- Richter: external hernia, entrapment of antimesenteric border in hernia orifice usually in older women with femoral hernias.
- Paraduodenal:(ligament of treitz) internal hernia
  - LEFT (75%): through fossa of Landzert, left of 4th portion of duodenum; CT shows encapsulated loops and anterolateral displacement of IMV
  - RIGHT (25%): through fossa of Waldeyer, caudal to SMA and inferior to 3rd portion of duodenum; CT shows encapsulated loops and anterior displacement of right colic vein
- Obturator: external hernia
- *GI Requisites*, 2nd, 293-299 and *Primer*, 3rd, 249-250
- ***Dahnert 5th 830-832***



- **Obturator Hernia**
- Plain film of the abdomen demonstrates a single loop of bowel projecting over the right superior pubic ramus.
- CT of the pelvis demonstrating an abnormal ovoid soft tissue mass in the region of the right obturator foramen between the right pectineus and obturator externus muscles





- **Cause of presinusoidal portal HTN (T/F):**
  - Budd-Chiari
  - Schistosomiasis
  - Laennec's cirrhosis
  - Biliary cirrhosis

- **Cause of presinusoidal portal HTN (T/F):**
  - Budd-Chiari
  - Schistosomiasis
  - Laennec's cirrhosis
  - Biliary cirrhosis

B. Schistosomiasis

Classification of Portal HTN

1. Prehepatic: Portal vein thrombosis or compression
2. Intrahepatic: Presinusoidal, Sinusoidal, Postsinusoidal
   - Presinusoidal: Schistosomiasis, PBC, A1AT, Wilson, sarcoid, CF, others
   - Sinusoidal: Hepatitis, Sickle cell disease
   - Postsinusoidal: Cirrhosis, venoocclusive disease of liver
3. Posthepatic: Budd-Chiari, Constrictive pericarditis, CHF

Dahnert 5th 733

- **TE fistula commonly associated with (T/F):**
  - ileal atresia
  - anal atresia
  - Malrotation
  - renal agenesis
  - syndactyly/polydactyly

- **TE fistula commonly associated with (T/F):**
  - ileal atresia- false
  - anal atresia- true
  - Malrotation- false
  - renal agenesis- true
  - syndactyly/polydactyly- false

- **1=F 2=T 3=F 4=T 5=F**
- TE fistula usually associated with VACTERL, cardiac anomalies, and other atresias/stenoses.
- Vertebral anomalies
- Anorectal anomalies – and other GI anomalies
- Cardiovascular anomalies – PDA, VSD, ASD, right aortic arch
- TracheoEsophageal fistula
- Renal anomalies: unilateral renal agenesis
- Limb anomalies: radial ray hypoplasia (not syndactyly)
  - Other atresias: duodenal atresia, imperforate anus, pyloric stenosis, annular pancreas.

Dahnert 5th 806-807*, Primer, 3rd, 816-817*

- **Concerning Crohn's disease (T/F):**
  - Mural asymmetry is a hallmark.
  - Colon and ileum equally involved
  - Jejunum commonly involved
  - Duodenum commonly involved

- **Concerning Crohn's disease (T/F):**
  - Mural asymmetry is a hallmark.- true
  - Colon and ileum equally involved- false
  - Jejunum commonly involved- false
  - Duodenum commonly involved- false

- **1=T 2= F 3=F 4=F**
- "Extensive inflammatory changes in the terminal ileum, asymmetric ulceration, and the presence of fistulas and sinus tracts are characteristic of Crohn's disease." Especially useful for its distinction from ulcerative colitis.
- Mural asymmetry is hallmark: True. You should know this by now.
- Colon and ileum equally involved: False.
  - Colon 22-55%, Terminal ileum in 95%
- Jejunum commonly involved: Depends on definition of "commonly"
  - Jejunum and ileum in 15-55%, no specific numbers for jejunum alone
- Duodenum commonly involved: False, most likely.
  - Duodenum in 4-10%

Dahnert 5th 809

- **What is the most likely complication in a Crohn's patient s/p partial small bowel resection:**
  - obstructive uropathy
  - renal calculi

- **What is the most likely complication in a Crohn's patient s/p partial small bowel resection:**
  - obstructive uropathy
  - **renal calculi**

B. renal calculi.

- GU complications include:
  - 1. Urolithiasis (5-10%): predisposed to oxalate and urate stones due to malabsorption
  - 2. Hydronephrosis (from strictures): no figures given, but Dahnert, Primer and Harrison's talk about stones much more frequently than they do about strictures and hydronephrosis
  - 3. Renal amyloidosis
  - 4. Focal cystitis
  - 5. Fistula formation: ileoureteral, ileovesical

Dahnert 5th 810, 981

- Extraintestinal complications of Crohn's include: gallstones, osseous complications (spondylitis, sacroileitis, steroid complications), renal stones (7%). *Primer, 3rd, 196*

- ***H. pylori* is associated with all of the following except:**
  - gastric ulcer
  - duodenal ulcer
  - Zollinger-Ellison syndrome
  - Gastric carcinoma
  - Lymphoma

- ***H. pylori* is associated with all of the following except:**
  - gastric ulcer
  - duodenal ulcer
  - **Zollinger-Ellison syndrome**
  - Gastric carcinoma
  - Lymphoma

- There is extensive literature associating Heliobacter pylori with gastric ulcers, and this is now well-accepted. The association with duodenal ulcers is weaker. H. pylori has been shown in MALT lymphomas, but causality is still lacking. H. pylori most commonly causes a gastritis. The resulting fold thickening may mimic lymphoma or gastric carcinoma. *Primer, 3rd, 169-170.*

- ***Dahnert 5th 824, 830, 842, 866***

[redacted]

1997

[redacted]

- **A small amount of free air is most likely to be seen in the following locations on a supine film (single best answer):**
  - cupola
  - perihepatic
  - around the falciform ligament
  - around the umbilical veins (inverted V-shaped)
  - Rigler's sign

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  - **perihepatic**
  - around the falciform ligament
  - around the umbilical veins (inverted V-shaped)
  - Rigler's sign

B. Perihepatic

- According to Baker, The Abdominal Plain Film, p. 79, small collections of air can be seen as oval lucencies located just below the right hemidiaphram. Dähnert describes lucencies over the liver. Cupola is a domelike structure and refers to the dome of the diaphragm. Moderate amounts of free air may be seen around the faliciform ligament. Free air around the umbilical veins is only seen with large volume pneumoperitoneum. Rigler's sign aka serosal sign (gas outlining both sides of the bowel wall as a thin linear stripe on the non-luminal side) *Gore and Levine p180*
- "Small amounts of air collecting in the posterior hepatorenal space (pouch of Morrison) may be seen on supine films as a triangular lucency projected over the liver." ***Kirks 3rd p890***
- RUQ gas – best place to look for small collections of free air
  - ***Dahnert 5th 746-747*** – nice summary of findings
  - *Emedicine; Pneumoperitoneum*

- **Concerning filiform polyps (multiple true/false):**
  - associated with ulcerative colitis
  - associated with Crohns
  - associated with Turcots
  - premalignant

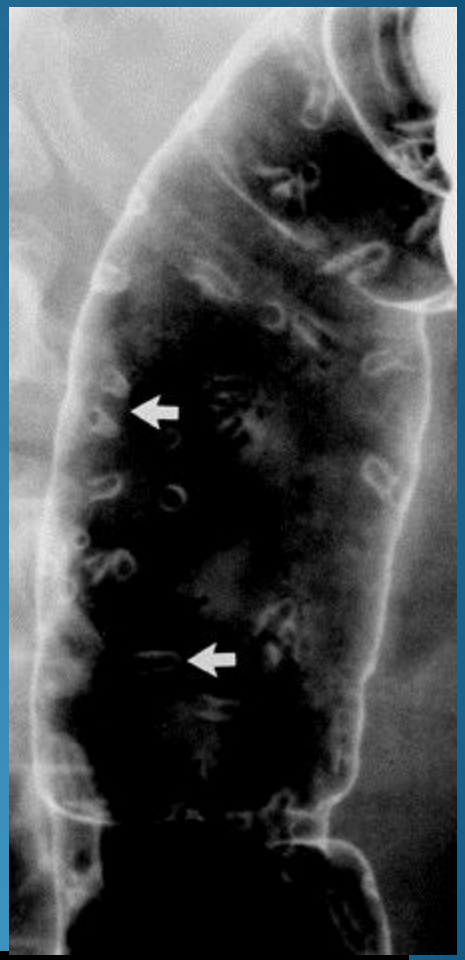
- **Concerning filiform polyps (multiple true/false):**
  - associated with ulcerative colitis- True
  - associated with Crohns- True
  - associated with Turcots- False
  - Premalignant- False

- **A. T B. T C. F D. F**
- Filiform polyps / Polyposis (also known as postinflammatory polyps and pseudopolyps) are a benign condition, not associated with cancer, and seen in the colon. These "polyps" are associated with inflammatory/infectious conditions, seen with ulcerative colitis, crohn's disease and other granulomatous colitis, proximal to an obstruction, and occasionally with schistosomiasis and amebic colitis. Imaging - thin, short, branching structures, "fingerlike", and frondlike.
  - most common in the left colon
- Turcots: a autosomal recessive disease with colonic polyposis and CNS tumors that lead to death from brain tumor in 2nd or 3rd decade
- ***Dähnert 5th p775, 863, 864***

Filiform Polyps







- **GI Match concerning the anatomy of the liver:**
  1. **Divides the left lobe into lateral and medial segments**
  2. **Divides the right lobe into anterior and posterior segments**
  3. **Divides the liver into right and left hepatic lobes .**

  - common bile duct
  - umbilical vein
  - ligamentum teres hepatis
  - middle hepatic vein
  - right hepatic vein running in the plane between the gallbladder and the IVC

- GI Match concerning the anatomy of the liver:
- 1. Divides the left lobe into lateral and medial segments= ligamentum teres hepatis
- 2. Divides the right lobe into anterior and posterior segments- right hepatic vein running in the plane btw the gb and the ivc
- 3. Divides the liver into right and left hepatic lobes .- middle hepatic vein

- Functional segmental liver anatomy is based on the distribution of the 3 major hepatic veins.

1. Divides the left lobe into lateral and medial segments - c.

- The fissure for the ligamentum teres (obliterated umbilical vein connecting the placental venous blood to the left portal vein) is located at the free margin of the falciform ligament and divides the LEFT hepatic lobe into medial and lateral segments (divides subsegment 3 from 4).

2. Divides the right lobe into anterior and posterior segments - e.

The right hepatic vein separates the anterior and posterior segments of the right hepatic lobe.

3. Divides the liver into right and left hepatic lobes - d.

The middle hepatic vein separates the right from the left hepatic lobes.

Dahnert 5th 673-675

Match the following hormones with their syndromes (matching):

1. **VIP**
2. **Bradykinin**
3. **Calcitonin**

a. Diarrhea syndrome
b. MEN 3
c. Carcinoid
d. ZE syndrome

Match the following hormones with their syndromes (matching):

1. VIP- diarrhea syndrome
2. Bradykinin- carcinoid syndrome
3. Calcitonin- MEN 3

- **1. VIP: a. Diarrhea Syndrome**
  - VIPoma syndrome, WDHH (watery diarrhea, hypokalemia, hypochlorhidria) *Source:Ganong's Physiology, Cecil's text of medicine*
  - ***Dähnert 5th p726***

- **2. Bradykinin: c. carcinoid syndrome**
  - Carcinoids secrete ACTH, histamine, bradykinin, kallikrein, serotonin
  - ***Dahnert 5th 801***

- **3. Calcitonin: b. MEN 3**
  - calcitonin: secreted by thyroid C-cells, the precursor of medullary thyroid carcinoma
  - Medullary thyroid carcinoma associated with MEN II and III (aka MEN IIa and IIb, respectively)
  - ***Dahnert 5th 396, 723***

Match the following with regard to anatomic relationship (matching):

1. **Caudate lobe**
2. **Uncinate process of the pancreas**
3. **Right renal artery**

a. cephalad to portal vein
b. lateral to IVC
c. posterior to IVC
d. posterior to SMV

Match the following with regard to anatomic relationship (matching):

1. Caudate lobe- cephalad to portal vein

2. Uncinate process of the pancreas- posterior to SMV

3. Right renal artery- posterior to IVC

Match the liver lesions with their associations (matching):

1. **Prone to bleeding**
2. **Cystic**
3. **Prolonged uptake on Tc99m RBC study**
4. **Pedunculated**

a. hepatic adenoma
b. hemangioma
c. mesenchymal hamartoma
d. biliary cystadenoma

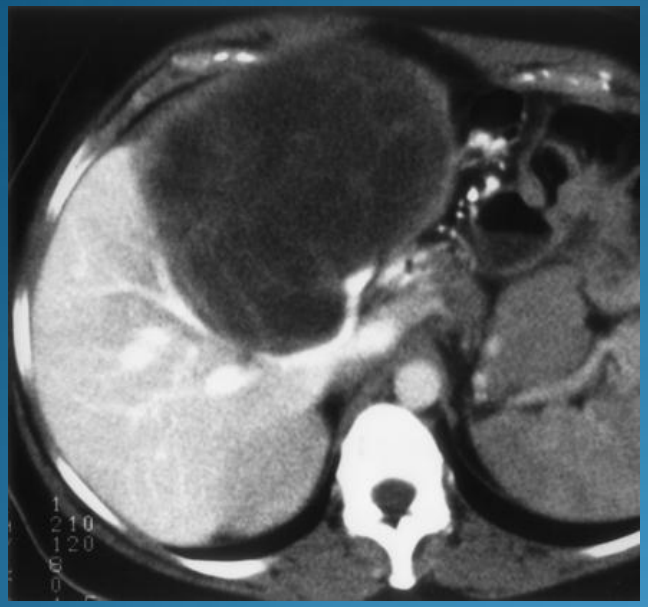
Match the liver lesions with their associations (matching):

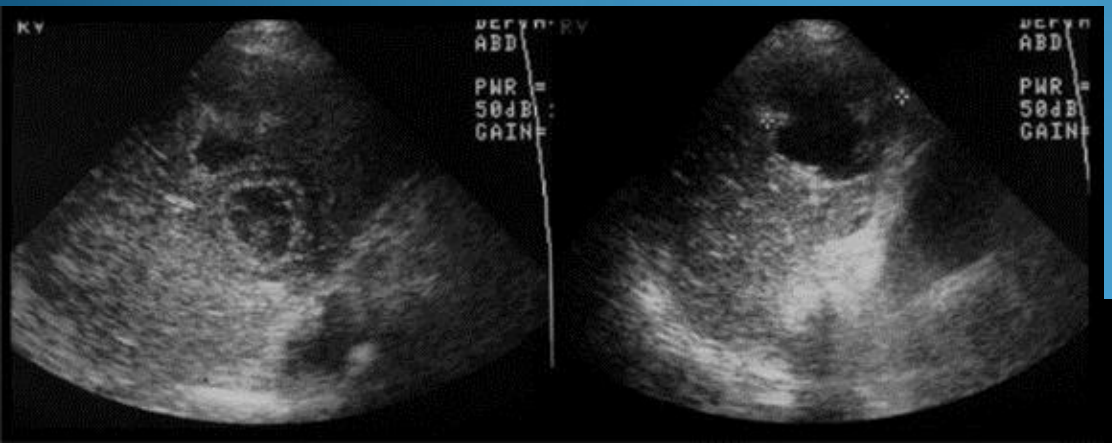
1. Prone to bleeding- hepatic adenoma
2. Cystic- mesenchymal hamartoma & biliary cystadenoma
3. Prolonged uptake on Tc99m RBC study- Hemangioma
4. Pedunculated- hepatic adenoma

- 1. Prone To Bleeding – A
  - ***Dahnert 5th 708***
- 2. Cystic – C And D
  - ***Dahnert 5th 719, 682-683***
- 3. Prolonged Uptake On Tc99m RBC Study – B
  - ***Dahnert 5th 709-710***
- 4. Pedunculated – A
  - Adenomas 10%: ***Dahnert 5th 708***
  - ***Pedunculated hepatic adenoma: sonographic and MR imaging features****; AJR*

- ***CT and MR Imaging of Benign Hepatic and Biliary Tumors***; Radiographics

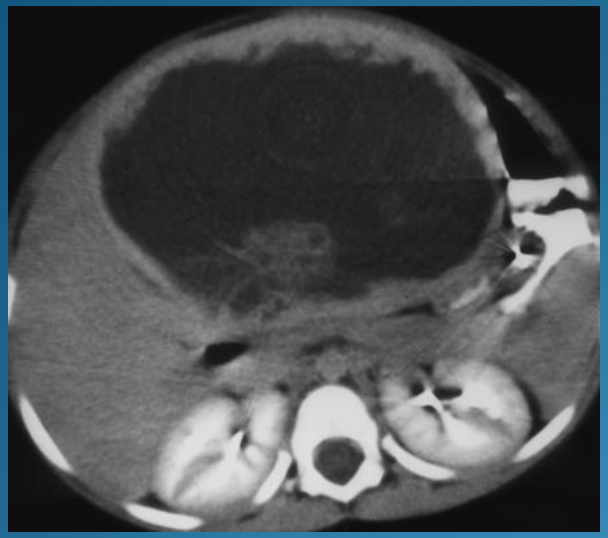
Biliary Cystadenoma

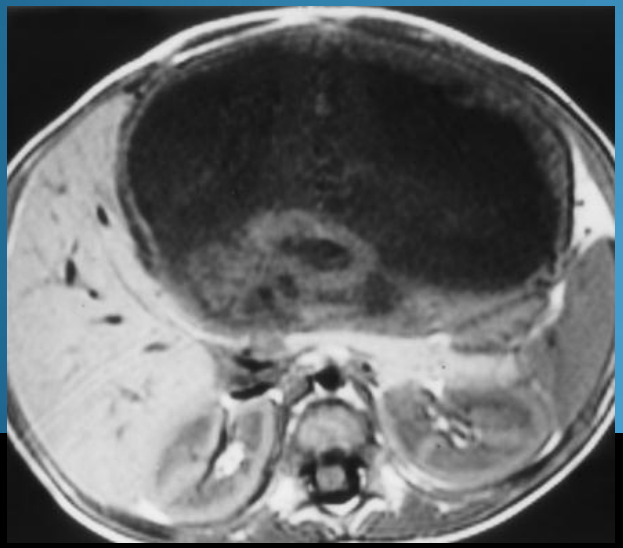




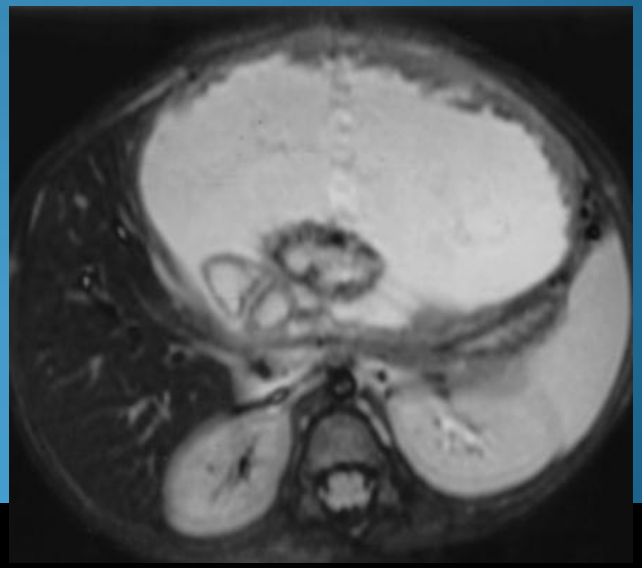
- Contrast-enhanced computed tomography scan in an elderly woman. The image demonstrates a large, well-defined, multiloculated, hypoattenuating lesion in the left hepatic lobe. The cystic lesion was lined by columnar epithelium,
- The images demonstrate an intrahepatic cystic lesion that is anechoic, with papillary projections into the lumen, a characteristic finding in biliary cystadenoma. In this patient, ultrasonographic evaluation demonstrated more complex features, which helped to exclude a simple hepatic cyst.

Mesenchymal Hamartoma

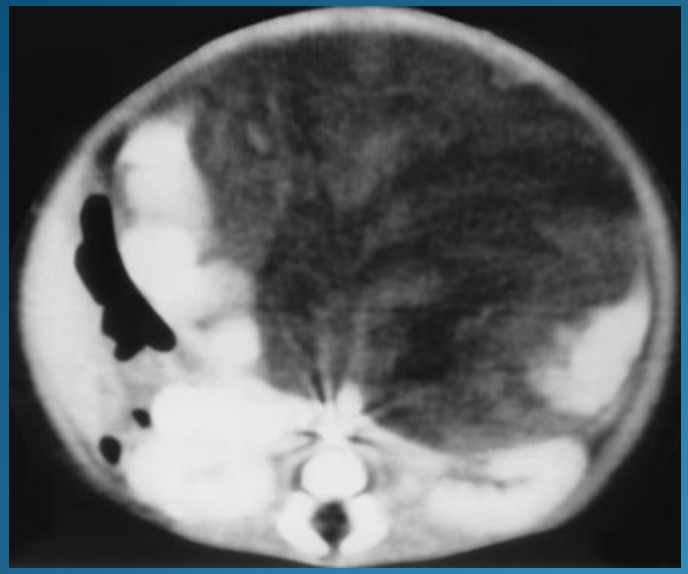




- Large mesenchymal hamartoma in a young child. Contrast-enhanced CT scan (**a**), T1-weighted MR image (**b**), and T2-weighted MR image (**c**) show that the tumor is predominantly cystic but has a thick wall and some enhancing internal stromal components.



Infantile Hemangioendothelioma





- Hemangioendothelioma in a neonate with congestive heart failure. (**a**) Early-phase contrast-enhanced CT scan demonstrates a 20-cm hemangioendothelioma with peripheral lobular areas of intense enhancement. (**b**) Delayed CT scan shows inhomogeneous enhancement of the mass.

- **Most common cause of unilateral lymphangitic spread of carcinoma (single best answer):**
  a. lung cancer
  b. breast cancer
  c. cervical cancer
  d. gastric cancer

- **Most common cause of unilateral lymphangitic spread of carcinoma (single best answer):**

  a. **lung cancer**

  b. breast cancer

  c. cervical cancer

  d. gastric cancer

A. Lung cancer.

- Lymphangitic carcinomatosis is a bilateral process, but may be unilateral in primary lung cancer

Dahnert 5th 502
Emedicine; Lymphangitic Carcinomatosis

- **GI Necrotizing migratory erythema is characteristic of which of the following diseases (single best answer):**

  a. Verner Morrison

  b. glucagonoma

  c. gastrinoma

  d. somatosatinoma

- **GI Necrotizing migratory erythema is characteristic of which of the following diseases (single best answer):**

  a. Verner Morrison

  b. glucagonoma

  c. gastrinoma

  d. somatosatinoma

- All the choices refer to pancreatic diseases. ***Dähnert 5th p725***
- Glucagonaoma is an uncommon tumor, M< F. Usually located in pancreatic body/tail and is from 2-25 cm at diagnosis and arises from alpha cells. Hypervascular in 90%. Associated with necrolytic migratory erythema aka necrolytic erythema migrans (macules/papules of lower extremety, groin, buttocks, face); diabetes mellitus; anemia; wt loss. In 80% malignant transformation - usually large & liver mets at time of Dx.
- Gastrinomas – 2nd most common islet cell tumor, in alpha/delta cells. Associated with MEN I, Zollinger-Ellison syndrome and GI bleeding. 90% in pancreas, 50% solitary in head/tail, 50% malignant, 10% in duodenal wall, 70% are hypervascular.
- Somatostatinoma is from the delta cells of the pancreatic head. It is hypervascular; malignant trasformation in 50-90%.
- Verner Morrison syndrome is due to a VIPoma which are usually solitary and arise from delta cells in pancreatic body/tail. Can occasionaly be extrapancreatic: ganglioblastoma, pheochromocytoma, lung, neuroblstoma). Produces watery diarrhea, hypokalemia, hypochlorhydria (WDHH syndrome).

Regarding diseases involving the colon (matching):

1. **Lymphogranuloma venereum**
2. **Ulcerative colitis**
3. **Behçet disease**
4. **Amebiasis**

a. Fistula
b. aphthous ulcers
c. granular mucosa
d. toxic megacolon

Regarding diseases involving the colon (matching):

1. Lymphogranuloma venereum-Fistula
2. Ulcerative colitis- Toxic Megacolon
3. Behçet disease- Aphthous Ulcers
4. Amebiasis- granular mucosa

- **1. Lymphogranuloma Venereum: A. Fistulae.**
- This condition results from a granulomatous inflammatory response to a STD caused by chlamydia. Usually starts in the rectum and works proximally resulting in abscess and fistula formation, often between rectum and vagina. Radiographic findings include increased presacral space and narrow, short, straight rectosigmoid. ***Dähnert 5th p841***
- **2. Ulcerative Colitis: D. Toxic Megacolon**.
- ***Dahnert 5th 863-864***
- **3. Behçet disease: b. aphthous ulcers**
- (stomatitis), genital ulcers, and ocular inflammation make up the TRIAD associated with this idiopathic, multisystem inflammatory condition. Relapsing course of mucocutaneaus and ocular symptoms. High mortality due to tendency for multiple intestinal perforations including esophageal. Colonic findings include deep ulcerations in otherwise normal mucosa. Other associations – migratory thrombophlebitis, chronic meningoencephalitis. DDx: crohn's and UC. ***Dähnert 5th p796***
- **4. Amebiasis: c. granular mucosa**, (a. fistulae, d. toxic megacolon)
- is seen in this condition due to mucosal edema and punctate ulcers. Ulceration is followed by sloughing of the mucosa and often secondary bacterial infection. Toxic megacolon can result here as well (note overlap of granular mucosa and toxic megacolon with UC). Usually affects areas of relative stasis (right colon and cecum), less frequently more distal areas. Etiology: Entamoeba histolytica. Other radiographic findings: loss of haustration, "collar-button" ulcers, and a cone-shaped cecum. Granular mucosa is a primary finding on exam, but fistulae and toxic megacolon are potential complications. ***Dahnert 5th 791***

- **Regarding diseases of the gallbladder (matching):**
  1. **Mirrizi syndrome**
  2. **Kawasaki disease**
  3. **Adeonomyomatosis**

  a. hydrops of the gallbladder
  b. cystic duct stone with intrahepatic biliary duct dilation
  c. segmental gallbladder wall thickening
  d. hyperechoic foci, without shadowing which project into the lumen of the gallbladder

- Regarding diseases of the gallbladder (matching):
- 1. Mirrizi syndrome- cystic duct stone with intrahepatic biliary duct dilation
- 2. Kawasaki disease- hydrops of the GB
- 3. Adeonomyomatosis- segmental GB wall thickening

- **1. Mirrizi Syndrome b.**
- cystic duct stone with intrahepatic ductal dilatation… due to extrinsic compression on right side of common hepatic duct by large cystic duct stone and chronic inflammation, can create fistula between cystic and common hepatic ducts. TRIAD:impacted gallstone, dilatation of proximal hepatic ducts, smooth segmental stenosis. DDx: lymphadenopathy, neoplasm. ***Dahnert 5th 722***
- **2. Kawasaki disease a**.
- gallbladder hydrops (transient), also intestinal pseudo-obstruction. This is a mucocutaneous lymph node syndrome that presents as an acute febrile multisystem vasculitis with a predilection for the coronaries. Strikes children <5yrs, rash, conjunctivitis. ***Dähnert 5th p634***
- **3. Adenomyomatosis c.**
- segmental gall bladder wall thickening, or can be diffuse. Benign proliferation of normal tissues, associated with gallstones (25-75%), >35yrs. Can see dilated Rokitansky-Aschoff sinus that project into the thickened wall (not into the lumen as in choice d.) ***Dahnert 5th 715-716***
- Choice d. likely refers to cholesterol polyps – fixed non-shadowing polypoid echogenic lesions. If diffuse surface deposition of small polyps, gives the appearance of a "strawberry gallbladder."

- **Regarding focal nodular hyperplasia (Multiple T/F)**
  - Prone to bleeding
  - Strong association with oral contraceptives
  - May be complicated by malignant transformation
  - Demonstrates increased uptake on sulfur-colloid exam

- **Regarding focal nodular hyperplasia (Multiple T/F)**
  - Prone to bleeding- False
  - Strong association with oral contraceptives- False
  - May be complicated by malignant transformation- False
  - Demonstrates increased uptake on sulfur-colloid exam- True

- Focal nodular hyperplasia (RARE – 357 cases ever, benign congenital hamartomatous condition, probably hyperplastic response to congenital AVM or other insult, multiple in 20%, specific diagnosis RARELY POSSIBLE, commonly multiple, R>L lobe)
- **A. False (?)**. "Rarely rupture with hemoperitoneum. " Likelihood of bleeding increases with OCP usage. Depends what they mean by "prone" to bleed…they can, but rarely do.
- **B. False**. "OCPs do not cause cause FNH, but exert a trophic effect on their growth." (Dahnert)
- **C. False**. No mention of malignant transformation in Dahnert. One source said rarely undergoes malignant degeneration; others did not mention it, or said no degeneration. I go with false.
- **D. True**. Depends on what they mean by increased uptake on sulfur colloid exam. Sources said normal uptake (58-70%), cold (30-35%), hot (7-10%). However, of the common liver lesions, only FNH contains a sufficient number of Kupffer cells to take up sulfur colloid at all. Maybe that's the distinction they are trying to make. DDx: regenerative nodules of cirrhosis, hepatocellular adenoma.

Dahnert 5th 703-704

- **Regarding GI bleeds which of the following is true**
  - Greater than 1.5 ml per minute necessary for identification on nuclear medicine scan
  - Sulfur colloid is equally sensitive to in vitro RBC study
  - A new focus of activity must move on subsequent images in order to be definitively positive
  - Twenty-four-hour images will help to localize the site of bleed

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  - Twenty-four-hour images will help to localize the site of bleed

- **C. A New Focus Must Move To Be Positive**
- **A. False**. For detection on tagged RBC scan there must be at least 0.1ml/min. Angio needs at least 0.5ml/min.
- **B. False**. Sulfur colloid can be used, but it is less sensitive because of quicker clearance from blood pool. Therefore, intermittent bleeding can be missed. Also liver and spleen uptake obscures the upper abdomen. Lower abdomen views are clearer because faster clearance means better target to background ratio.
- **C. True**. If focus of activity does not move, may be angiodysplasia or aneurysm. See Reqs 283.
- **D. False**. Twenty-four hour images may see the blood, but it is impossible to tell where it originated, i.e. upper v. lower.
- ***Dahnert 5th 1111-1112; Nucs Reqs 2nd 280-287***

- **Regarding glucagon all are false except**
  a. Mediates its effects via the vagal nerve
  b. Does not relax the sphincter of Oddi
  c. Contraindicated in pheochromocytoma
  d. Contraindicated in patients with glaucoma

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Glucagon

- Glucagon is produced by alpha cells of the pancreas. The main stimulus for its release is hypoglycemia. It is an insulin antagonist, thus it increases blood glucose levels. It causes the relaxation of smooth muscle cells, it relaxes the gallbladder sphincter and the sphincter of Oddi thus increasing bile flow. **Contraindications include pheochromocytoma and insulinoma**.

Dahnert 5th 779-780

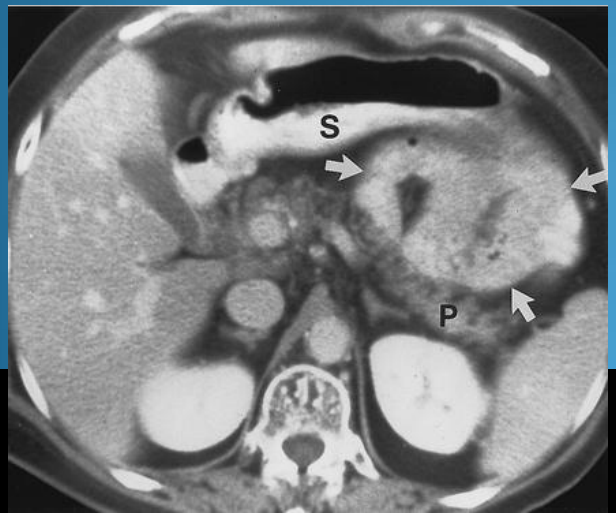
- **Regarding internal hernias all are false except**
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  b. Right paraduodenal hernias go through the fossa of the Lanzert
  c. Transmesocolic (?transmesenteric) hernias are congenital
  d. Paraduodenal hernias are usually supracolic

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Paraduodenal hernias

- Paraduodenal (mesocolic) hernias may be regarded as developmental anamolies caused by trapping of bowel loops in colonic mesentery before completion of fixation and obliteration. The hernia sacs are thus formed by mesocolon. They represent 50% of internal hernias (5% of all hernias). When on the left side (3/4), they are through the fossa of Landzer. When on the right side (1/4), they are through the fossa of Waldeyer. Internal hernia incidence 0.5 - 3% of intestinal obstruction- paraduodenal hernias most common (75% left - 25% right)- left hernias occur through congenital fossa of Landzert to the left of ascending colon and extends down into descending mesocolon. Look for: SB loops in left abdomen - lateral to 4th part of duodenum. On the right, herniation is through fossa of Waldeyer and then extends down into ascending mesocolon. Look for: SB loops in lower right abdomen (inf. to descending duodenum) often associated with partial intestinal malrotation. Both right and left hernias depress the transverse colon. Angiogram may be helpful in demonstrating reverse course of jejunal branches of SMA. *Source: Ravin p. 775*
- Transmesenteric hernias are iatrogenic caused by fenestration of mesocolon in creating Roux-en Y. There were nine female and five male patients, aged 12–82 years (mean, 53 years), with a transmesenteric hernia. Of these 14 patients, eight had undergone orthotopic liver transplantation (OLT) with Roux-en-Y biliary-enteric reconstruction, and five had undergone prior abdominal surgery with small- or large-bowel resection
  - ***Internal Hernia: Clinical and Imaging Findings in 17 Patients with Emphasis on CT Criteria1***
  - *Radiology*
- Dahnert 5th 831-832.





- Left-sided **paraduodenal** hernia in a 42-year-old woman with left-sided periumbilical pain and a palpable mass. SBFT image demonstrates a saclike mass of mildly dilated jejunal loops (solid arrows) to the left of the ligament of Treitz. Mass effect is noted and causes displacement of the greater curvature and posterior wall of the stomach (open arrow).
- Left-sided **paraduodenal** hernia in a 55-year-old man with chronic abdominal pain. **(a)** Transverse CT scan through the upper abdomen shows a saclike mass of jejunal loops (arrows) in the left upper quadrant interposed between the pancreas (*P*) and stomach (*S*

- **Regarding primary hemochromatosis which is false**
  a. Associated with Keiser-Fleicher rings
  b. Ten times greater in males than females
  c. Involvement of the heart and pancreas is characteristic

- **Regarding primary hemochromatosis which is false**
  a. **Associated with Keiser-Fleicher rings- Wilson's disease**
  b. Ten times greater in males than females- True
  c. Involvement of the heart and pancreas is characteristic- True

- Primary hemochromatosis is an autosomal recessive disorder characterized by an unexplained increased GI absorption of dietary iron. The iron is deposited in the heart, pancreas, and other organs. In the liver the iron is deposited in hepatocytes not Kupffer cells. Untreated patients will ultimately develop cirrhosis. Males are affected more than females (10:1). Patients develop hepatomegaly (early), cirrhosis, skin pigmentation, & diabetes mellitus ("bronze diabetes"). They have elevated serum iron, TIBC, and ferritin levels. Complications include an increased risk for hepatoma, hepatic failure, diabetes mellitus (due to pancreatic involvement), cardiac conduction disturbances, and CPPD deposition disease (most commonly involves the hands, especially the 2d and 3d metacarpal heads). Treatment consists of repeated phlebotomy. On CT there is generalized increased liver density. The spleen, pancreas, and pericardium may also increase in density due to reticuloendothelial uptake in these locations. On MRI there is classically a "black" liver with low signal on T1 (usually the liver is higher in signal than the spleen) and low on T2 (liver is usually of low signal on T2, spleen is very bright). Loss of signal may also be seen in the pancreas and myocardium (findings which are not seen in secondary hepatic iron overload). The spleen is typically normal, or in some cases decreased, signal intensity. Secondary hemochromatosis is characterized by the loss of signal in both the liver and spleen, while the pancreas maintains a normal signal intensity. Other radiographic findings: Skeletal findings in hemochromatosis include generalized osteoporosis, chondrocalcinosis (found in over 60% of patients- the knee is the most common site), hook-like osteophytes from the metacarpal heads, and subchondral cysts (metacarpal heads). Secondary hemochomatosis is seen in patients with beta-thalassemia or other hemolytic anemias that require multiple transfusions and actually represents hemosiderosis as iron is deposited in Kupffer cells and other RES (reticuloendothelial cell system) cells alone. The condition requires no treatment. Iron may eventually be deposited within parenchymal cells once the reticuloendothelial cells become iron saturated (usually after transfusion of greater than 40 units of blood). M:F = 10:1

Dahnert 5th 706-707

Regarding small bowel disease (multiple matching):

1. **Whipple's disease**
2. **Sprue**
3. **Mastocytosis**

a. dense bones
b. lymphoma of the small bowel
c. greater in Caucasian males

Regarding small bowel disease (multiple matching):

1. **Whipple's disease- greater in caucasian males**
2. **Sprue- aka Celiac Sprue lyphoma of the SB** (Increased incidence of squamous cell carcinoma of pharynx and esophagus and of adenocarcinoma and lymphoma of small bowel in patients with celiac disease)
3. **Mastocytosis- Dense Bones**

Whipples: greater in caucasian males

- M:F = 8:1; Caucasians
- ***Dahnert 5th 865***

Sprue: Lymphoma of the small bowel

- Lymphoma in 8%
- ***Dahnert 5th 860***

Mastocytosis: Dense bones

- Scattered sclerotic foci (skeletal involvement in 70%)
- ***Dahnert 5th 845***

- **GI Regarding small bowel obstruction which is true**
  a. Etiology is tumor > hernia > adhesions (i.e., in decreasing frequency)
  b. Midgut volvulus represents a closed loop obstruction
  c. CT scan is not useful to distinguish ileus from mechanical obstruction

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  a. Etiology is tumor > hernia > adhesions (i.e., in decreasing frequency)
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B. midgut volvulus is a closed loop

- **A. F**. Small bowel obstruction is the most common surgical condition of the small bowel. Causes of SBO inclue: adhesions (60%) > hernias (20%) > neoplasms (15%) > other (5%) (regional enteritis, volvulus, gallstone ileus, intussusception). (Essentials of General Surgery, 2nd edition) ***Dahnert 5th 751*** – similar numbers
- **B. T**. Midgut volvulus is torsion of entire gut around SMA due to a short mesenteric attachment. It presents as a medical emergency in the newborn with biliuos vomiting. In an older child, may have intermittent obstructive symptoms. On plain film will see "double bubble sign" of air in stomach and duodenum. On barium stuies, Lig of Trietz inferior to duodenal bulb & to the right of expected position; may also see a "corkscrew" appearance of the midgut loops. On CT will see spiral loops on right side. ***Dähnert 5tth 850***
- **C. F**

- **The following is most useful in establishing the diagnosis of typhlitis (single best answer):**
  a. thumb printing
  b. pneumatosis
  c. thickened folds in the distal ileum
  d. history of immunocompromised status

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- Typhlitis is a transmural inflammatory and/or necrotizing process involving the cecum and/or terminal ileum and appendix in close association with neutropenia. This is also been called ileocecal syndrome or neutropenic typhlitis.
- Predisposed - leukemia, lymphoma, aplastic anemia, immunosupressive drug therapy, organ transplantation, and AIDS.
- Findings:
  - fluid filled mass-like density in RLQ
  - thumbprinting of colon/cecum
  - edema/ulceration of entire bowel wall
  - circumferential cecal wall thickening (also on CT)
  - occasional pneumotosis
  - Agents involved - Pseudomonas, CMV, E. coli, B. fragalis, Enterobacter
  - Complications - Perforation and abscess formation.Therefore early diagnosis and treatment is essential because of the rapid progression to transmural perforation, which carries a high mortality rate.
  - Note that a barium enema carries increased risk of perforation and is not performed for diagnosis
- Treatment - high dose antibiotic and iv fluidsDiff Dx
- \+ leukemic/lymphomatous infiltration (can exist simultaneously with typhlitis. Infiltration with leukemia/lymphoma is more eccentric in the bowel wall usually.
  + intramural hemorrhage
  + ischemia
  + segmental pseudomembranous colitis
  + appendicitis / right sided diverticulitis
  + inflammatory bowel disease

Dahnert 5th 863

- **The following is not part of the esophagus (single best answer):**

  a. serosa

  b. mucosa

  c. longitudinal muscle layer

  d. muscularis mucosa

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A. serosa

- The esophogus is composed of an inner mucosal layer, a circular muscle layer and a longitudinal muscle layer. The musculature of the upper 1/3 is skeletal muscle while the lower 2/3 is smooth muscle. In contrast to the rest of the GI tract, there is no serosal layer. This is significant because it explains the ease of extension of neoplasms that originate in the esophogus and the ease at which esophogeal perforation occurs. *(Essentials of General Surgery, 2nd edition)*

- **GI The following is true regarding Zenker's diverticulum (single best answer):**
  - associated with cancer in 5%
  - empties by contraction of its muscular walls
  - is a traction diverticulum
  - occurs below the level of the crichopharyngeus muscle
  - occurs in the posterior midline

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  - empties by contraction of its muscular walls
  - is a traction diverticulum
  - occurs below the level of the crichopharyngeus muscle
  - **occurs in the posterior midline**

E. occurs in the posterior midline

- **A. False**. According to Gore, Levine and Laufer, it is associated with cancer in 0.3%.
- **B. False**. Remember, it is a mucosal herniation, so it contains no muscular walls.
- **C. False**. It is a pulsion type diverticulum. – does not have a muscular wall
- **D. False**. It occurs just above the cricopharyngeus. It occurs as a herniation of mucosa and submucosa through a defect in the posterior aspect of the pharyngoesophageal junction. It occurs through an area of potential weakness (Killian's dehiscence) in the midline between horizontal and oblique fibers of the inferior constrictor muscle. May occur due to incomplete relaxation of the cricopharyngeus, although this is controversial.
- **E. True**. At least when they are small. When they are larger, they may project laterally, usually to the left. *GI REQ 2nd p32*

Dahnert 5th 866

- **The following polyposis syndrome(s) is/are NOT inherited (single best answer):**
  a. Gardner's syndrome
  b. Turcot's syndrome
  c. Cronkhite-Canada syndrome
  d. Peutz-Jeghers syndrome
  e. multiple hamartomas

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  d. Peutz-Jeghers syndrome
  e. multiple hamartomas

C. Cronkhite-Canada syndrome

- Nonneoplastic nonhereditary hamartomatous polyps
- ***Dahnert 5th 810-811***

- **Which of the following will increase the density of the liver as seen on contrast CT?**
  a. Amyloid
  b. Amiodarone
  c. Steatosis
  d. chemotherapy

- **Which of the following will increase the density of the liver as seen on contrast CT?**
  a. Amyloid- Diffuse infiltration is the rule, which causes decreased attenuation at **CT and hepatomegaly (RadioGraphics 2004;24:405-416)**
  b. Amiodarone
  c. Steatosis- low attenuation
  d. Chemotherapy- usually causes a decrease in liver attenuation with exception of cyclophosphamide

Increased Liver Density on CT

- Substances which cause increased density of the liver on CT scanning include substances with high atomic number, such as:
  - Iron: Primary hemochromatosis, Transfusional hemosiderosis, Bantu siderosis (excessive dietary iron from food prep in iron containers)
  - Copper: Wilson's disease = hepatolenticular degeneration
  - Iodine: Amiodarone = antiarrhythmic drug with 37% iodine by weight (liver 95-145 HU)
  - Gold: Colloidal form of gold therapy of rheumatoid arthritis
  - Thorotrast®: included for historical purposes (not used since ~1960)
    a 25% colloidal suspension of 232ThO2 , physical half-life, 1.4 x 1010 yrs (= 14 **billion** years); this may somewhat overestimate its deleterious effects, as the biological half life is "only" 400 years. Hard Alpha emitter with atomic number of 90
    Caused increased incidence of Hepatic CA, etc.
  - Thallium: Accidental/suicidal ingestion of rodenticides (lethal dose is 0.2 -1.0 g)
  - Acute massive protein deposits
  - Glycogen storage disease
- ***Dahnert 5th 857***

Increased Liver Density

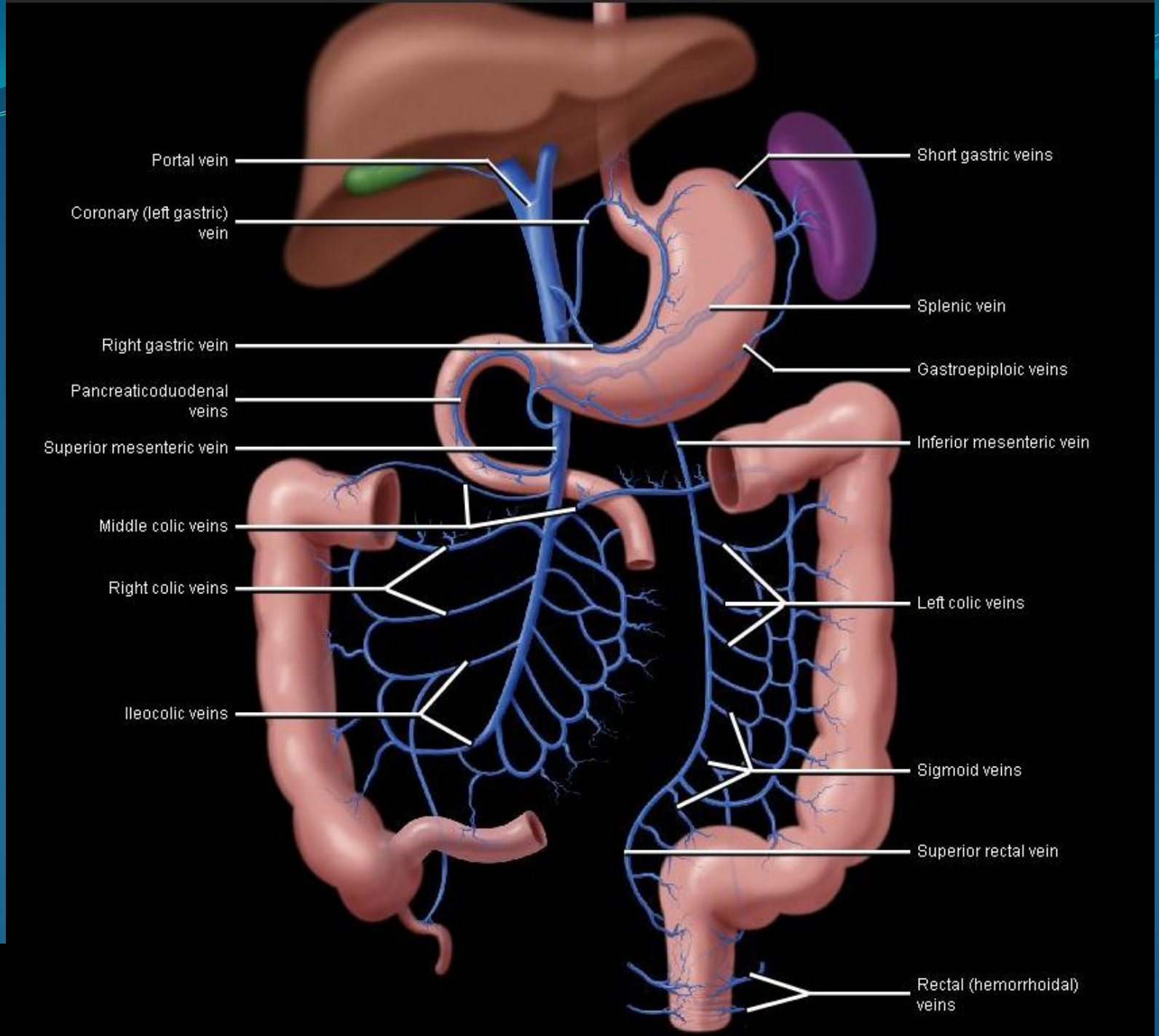
- mnemonic: "**GG CHAT**":
  - **G**old therapy,
  - **G**lycogen storage disease,
  - **C**yclophosphamide (most chemotherapy causes decreased density of the liver),
  - **H**emochromatosis/hemosiderosis, **A**
  - mioderone,
  - **T**horotrast
- ***Dahnert 5th 857***

- **Concerning gastric varices (single best answer):**
  a. communicate with the coronary vein
  b. may resemble leiomyosarcoma

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Gastric Varices

- The gastric fundus contains a venous plexus that is normally drained by numerous short gastric veins that anastomose distally with the splenic vein and proximally with branches of the coronary vein as well as by venous channels surrounding the distal esophagus. Blood in the short gastric veins normally empty via the splenic vein into the portal venous system.The two main causes of gastric varices are Portal HTN causes reversal of blood through the splenic veins into the short gastric veins producing fundal varices.
- Portal HTN also causes reversal of blood flow through the coronary vein causing esophageal varices. Classically, portal HTN causes both esophageal and gastric varices, but isolated esophageal varices are common, with isolated gastric varices less often seen.
- Varices are more likely to form in the esophagus and be seen because the gastric fundal veins have thicker and better connective tissue support than thin esophageal veins, and because gastric varices are many times obscured by gastric folds/rugae.Splenic vein obstruction causes isolated gastric varices without uphill esophageal varices. Obstruction can occur from intrinsic thrombosis, or more commonly from extrinsic compression (especially pancreatic processes).
- Gastric varices have a propensity to bleed, although less likely than esophageal varices.
- Imaging - On barium studies, double contrast should be used as single contrast is unreliable. Gastric varices appear as thickened tortuous "folds" or lobulated filling defects in the fundus of the stomach. On CT, enhancing varices can usually be readily appreciated, as well as the stigmata of cirrhosis/portal HTN or splenic vein obstruction. On angiography, dilated enlarged gastric veins are seen.Dff DX - Thickened nodular folds on barium studies also may represent hypertrophic gastritis, menetrier's dz, ZE syndrome, pancreatitis, lymphoma, or polypoid fundal carcinoma. Gastric varices may be changeable during the exam.Treatment - simple splenectomy for splenic vein obstruction/thrombosis.
  - porto-systemic shunt for portal HTN
- See Netter 226
- NB: Coronary vein = left gastric vein
- The remaining blood from the esophagus is drained away via the superficial veins lining the esophagus interior, which drain into the coronary vein (left gastric vein) which in turn, drains directly into the portal vein. Wikipedia


Portal vein
Coronary (left gastric) vein
Right gastric vein
Pancreaticoduodenal veins
Superior mesenteric vein
Middle colic veins
Right colic veins
Ileocolic veins
Short gastric veins
Splenic vein
Gastroepiploic veins
Inferior mesenteric vein
Left colic veins
Sigmoid veins
Superior rectal vein
Rectal (hemorrhoidal) veins

Gastric Varices

- **Gastric fundus is drained by short gastric veins anastomosing with splenic vein and branches of coronary vein**
- **Blood in short gastric veins empties via splenic vein into portal venous system**